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Von Thaer, *Principles of Agriculture.*

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English Agricultural Society.

OBJECTS OF THE SOCIETY.

I. To embody such information, contained in agricultural publications and in other scientific works, as has been proved by practical experience to be useful to the cultivators of the soil.

II. To correspond with agricultural, horticultural, and other scientific societies, both at home and abroad, and to select from such correspondence all information which, according to the opinion of the Society, may be likely to lead to practical benefit in the cultivation of the soil.

III. To pay to any occupier of land, or other person, who shall undertake, at the request of the Society, to ascertain by any experiment how far such information leads to useful results in practice, a remuneration for any loss that he may incur by so doing.

IV. To encourage men of science in their attention to the improvement of agricultural implements, the construction of farm-buildings and cottages, the application of chemistry to the general purposes of agriculture, the destruction of insects injurious to vegetable life, and the eradication of weeds.

V. To promote the discovery of new varieties of grain, and other vegetables useful to man, or for the food of domestic animals.

VI. To collect information with regard to the management of woods, plantations, and fences, and on every other subject connected with rural improvement.

VII. To take measures for the improvement of the education of those who depend upon the cultivation of the soil for their support.

VIII. To take measures for improving the veterinary art, as applied to cattle, sheep, and pigs.

IX. At the meetings of the Society in the country, by the distribution of prizes and by other means, to encourage the best mode of farm-cultivation, and the breed of live stock.

X. To promote the comfort and welfare of labourers; and to encourage the improved management of their cottages and gardens.

LOCAL AGRICULTURAL ASSOCIATIONS.

For the purpose of further promoting the objects for which the English Agricultural Society has been founded, the General Committee have resolved, That it is expedient to receive communications from Local Societies upon subjects connected with these objects; presenting to such Societies a Copy of the Journal whenever any Paper, communicated by them to the Journal Committee, shall have been deemed suitable for publication: the standing type being also placed at their disposal for printing off as many private copies of the Paper as may be required for distribution among their own Members.

DISTRIBUTION OF THE JOURNAL.

In order to effect the free transmission of the Journal, as it makes its appearance, to the various Members of the Society, gratuitously entitled to it, and residing in every part of the kingdom, with the greatest certainty and despatch, it is particularly desired that all Members in the neighbourhood of the same Market-Town would confer among themselves, and communicate to the Secretary a Complete List of their own names and correct addresses, along with the name of the individual to whom the copies may be addressed in one General Parcel, carriage-paid.

RICHMOND, *President.*

These experiments, it is true, are not easy; still they are in the power of every thinking husbandman. He who accomplishes but one, of however limited application, and takes care to report it faithfully, advances the science, and, consequently, the practice of agriculture, and acquires thereby a right to the gratitude of his fellows, and of those who come after. To make many such, is beyond the power of most individuals, and cannot be expected. The first care of all societies formed for the improvement of our science should be to prepare the forms of such experiments, and to distribute the execution of these among their members.

Von Thaer, *Principles of Agriculture.*

PAPERS READ

BEFORE THE

ENGLISH AGRICULTURAL SOCIETY.

I.—*On the present State of the Science of Agriculture in England.* Read March 13, 1839.

Though the national importance of husbandry will be at once admitted by every one, it may be well at the outset of our undertaking not to content ourselves with a general notion of that importance, but to look for a moment at some of the items which constitute its annual value. The wheat produced in England and Wales is estimated by Mr. Mac Culloch, one year with another, at 12,350,000 quarters. This single head of produce, therefore, at an average price of 50*s.*, will amount to nearly 31 million pounds sterling, yearly. The oats and beans have been reckoned at 13,500,000 quarters, and will give another head of 17½ millions sterling per annum. The grass lands, again, are supposed to yield, year by year, produce worth very nearly 60 millions sterling (59,500,000). The practical inference to be drawn from these large numbers is obviously this,—that, if by any improved process it be possible to add even in a small proportion to the average acreable produce either of arable or pasture land, this increase, small as it may seem, may be in fact a very large addition to our national wealth. The average produce of wheat, for instance, is stated at 26 bushels per acre: if, by a better selection of seed, we could raise this amount to 27 bushels only, a supposition by no means unlikely, we should by this apparently small improvement have added to the nation's annual income 475,000 quarters of wheat, worth, at 50*s.*, about 1,200,000*l.* yearly, which would be equal to a capital of 24 millions sterling gained for ever to the country by this trifling increase in the growth of one article alone, and that in England and Wales only.

But it is not merely with regard to the total of any branch of produce that numbers afford a striking result. The value of one crop of a single article of produce on an individual farm may be large, and the loss of that crop very serious; and since in the

improvement of agriculture we have to look, unfortunately, at least as much to the prevention of loss as to the increase of profit, it may be worth while on this head to take an instance from a vegetable of seemingly inferior value, the turnip.

It is well known that in the south of England, during two or three dry summers preceding the last, many farmers have lost nearly the whole of their turnip crops; and that by the drought and the ravages of their accustomed foe, the turnip-fly only, independently altogether of their new enemy, the black caterpillar: after repeated sowings, a crop came up, but so late in the year, that, for want of warmth, little or no root was formed, and the crop could not be valued at more than 1*l.* an acre. In the north, on the other hand, where farm-yard manure is liberally given to this crop, and carefully applied in the ridges on which the seed is drilled in immediate contact with it, where bone-dust is also purchased for the same purpose, on such highly-cultivated ground there would be far less risk of failure arising from the ordinary causes mentioned above. There is many a light-land farm in the south of England, of 500 acres, on which 100 acres have not produced turnips worth more than 200*l.* or 300*l.*, while the more spirited culture actually practised in Yorkshire might have yielded 20 tons of Swedes, or 30 tons of turnips from each acre. It is difficult to reduce the advantages of this superior yield to a money value. At the price for which the former roots have sold in one neighbourhood we are acquainted with, a high price it is admitted, but still one that has been paid for many years, they would have been worth 2000*l.*: so that the difference in the result of the two practices would be 1500*l.*; or, if an acre of the land be worth 1*l.* yearly, a difference of produce from one-fifth only of the farm amounting to three times the rent of the whole. Without insisting, however, upon this case, which is an extreme one, the following quotation from a recent statistical work will be sufficient for all practical farmers:—"The produce of turnips, when cultivated in the broadcast manner, varies from 5 to 15 tons an acre; the latter being reckoned a very good crop. In Northumberland and Berwickshire, a good crop of white globe turnips, drilled, weighs from 25 to 30 tons, the Yellow, and the Ruta Baga, or Swedish, a few tons less."

We may consider, in another point of view, the national effect which might result from a general improvement of agriculture: that is, the additional employment that would arise from any general effort made on the part of the landowner or the tenant to improve permanently, as by drainage, for instance, the texture itself of the soil: we do not mean of waste ground, but of that which is already, and has been perhaps for centuries, in course of cultivation. If a pound, only, were thus laid out on each acre, a

very moderate supposition, we shall find that, since there are 48 millions of cultivated acres in Great Britain and Ireland, a demand for country labour amounting to 48 millions sterling would thus be created; a demand exceeding that which the railroad bills professed to create in the session before last, and far more advantageous in its effect on the labourers, inasmuch as the demand would be a gradual one, not severing them from their homes and their families. The assumed outlay, however, of a pound only, for the permanent improvement of each acre, is probably far too low: 3*l.*, 4*l.*, or even 5*l.*, would be scarcely too much. There is much wet land on which 8*l.* or perhaps 10*l.* might be laid out to advantage; but at 4*l.* only, the new progressive demand for the villager's only commodity, the work of his hands, would be about 200 millions. So large an outlay as this last must indeed, in part, be necessarily deferred for a long course of years; but in whatever degree it may arise, it has, on the other hand, the further advantage arising from the nature of the work to be done, that the demand would necessarily take place in the winter months, when labour is most difficult to be obtained, not in the summer, when the crops are in progress, and the labourer finds already sufficient employment.

It would be an inquiry of much importance to investigate in detail the manner in which this permanent improvement of the soil might be conducted in the various districts of England, but the subject is so extensive that it requires to be handled separately; or, rather, it must be a leading object of our members' future inquiries, to collect such facts and make such trials as may give a solid answer to so extensive a question. Great assistance may doubtless be derived from the knowledge which geological maps have lately afforded us as to the general outlines of the various subsoils which lie immediately under the surface of our fields, and powerfully affect, as every practical farmer knows, the produce of the upper soil through which alone the plough usually passes. These beds of sand, stone, or clay cross England, in irregular courses, from south-west to north-east: the blue lias, for instance, from Charmouth in Dorsetshire, to Whitby in Yorkshire; and thus, by the help of a geological map, it might be known that a mode of improvement which had been well tested on a farm in Dorsetshire, would be applicable, due allowance being made for difference of climate, to another in Yorkshire. Manifest, however, as is the assistance that might long since have been derived by agriculture from geology, we know no book which has endeavoured until very recently* to secure that kindred aid for the Science which

* In 1837 Mr. John Morton had the merit of publishing a work on the application of geology to agriculture.

is the immediate object of our Society's labours. But, although it is impossible to follow this question of the permanent improvement of soils into all its details, it may not be amiss to look for a moment at its more general features; bearing in mind, that we are not now seeking for positive conclusions on which we would recommend that immediate outlay should be made on a large scale by practical farmers, but are endeavouring, as is the business of societies which desire to enlarge the bounds of actual knowledge, to obtain such a bird's-eye view of the field of inquiry as may show us what are the lines by which we may best hope to effect our advance into a country we desire to explore. All subsoils, then, as has been said, may be roughly divided into clays, sands, and stones—or rather the clayey, sandy, and stony: in the two former of which, the upper soil generally partakes of their mechanical nature, that is to say, the soil resting on clay will probably be close, and on sand loose; while in all the three it will chemically partake more or less of the subsoil's nature, that is, its substance will usually resemble, more or less, the bed on which it rests, for the plain reason, that it has partly been formed by the wearing and breaking up of that bed. Where sand predominates in the soil and subsoil, thin veins of clay are not of unusual occurrence in the latter, and where these are found they may be turned to great advantage; but to all sandy ground the Flemings have long applied a method of singular perseverance and proved success, which is shortly as follows. They dig trenches of rather more than a foot in width, and about a foot deep, over their field, at such a distance from each other that the intervals or lands between them are five times the width of the trench, from the bottom of which, assuming the soil to be ten inches deep, they have therefore dug up besides two inches of subsoil, and as they proceed they fling the whole over each land on which the seed has been previously sown, which they thus cover. The trench, being shifted sideways each year, and the same process renewed, at the end of six years two inches of the whole subsoil will clearly have been mixed with the upper surface, and the soil deepened by that amount. The original trench is then dug perhaps two inches lower, and at the end of another six years two more inches, at least, of depth, will have been gained. In this way, after four or five courses of trenching, that is to say, after twenty-four or thirty years, the soil is brought to a depth of 18 or 20 inches of uniform quality.* Nor does the industrious Fleming fold his arms when this labour of a life has been accomplished. The bed of mould into which he has converted the natural ground is preserved by

* See Flemish Husbandry, by the Rev. W. Rham, p. 71.—Library of Useful Knowledge.

similar toil. On a farm called Vollander, a little beyond Courtray, consisting of about 140 acres, the Rev. Mr. Rham went over a field of 106 acres, the whole of which has been repeatedly trenched, by the present occupier we imagine, to the depth of 2 or 3 feet. A deep soil, indeed, has this double advantage over a shallow one, even though both be equally sandy—that during dry weather roots can descend deeper in search of moisture, and that moisture rises from below, by capillary attraction, more freely towards them. But where veins of clay are found interlarding, as it were, the sand, the advantage will be far greater, because the sandy soil will be brought now into that moderately adhesive state which will entitle it to be ranked as a loam. Indeed, where clay is not found on the very spot, it may often be brought, as has long been the practice in Dorsetshire and in Norfolk, by horse-labour, from a moderate distance. It is worth remark that, in another part of this country, and on a different description of light soil, strong as is the disinclination of British husbandry for the use of the spade, great improvements have for a long time, over an extensive district, been effected by lifting clay from below and laying it upon the surface. It is the peat-district of Lincolnshire to which we allude. Here the soil consists of light vegetable matter, half-decayed fibres of plants, clothed in its natural state with rushes or heath. A handful of it presents very much the appearance of rappee snuff. At a depth varying from one to many feet lies a very stiff blue clay of the consistence of soap. When the land is brought into cultivation, trenches are opened down to this clay, and a heavy dressing of it is laid on the face of the ground, which three years afterwards is found to be imperfectly mixed in small lumps with the peat. At the end, however, of twelve years, after three such doses of clay have been given, a specimen which we have seen from this same ground, instead of a brown powdery substance like rotten bark, presents the appearance of a dark grey, rather stiff, loam not dissimilar to the garden-mould which is usually met with round London, capable of bearing heavy crops of cole oats and wheat in rotation, being, in fact, the soil of a most valuable description of farm, which has been manufactured from the two steril raw materials, pure peat and mere clay.

It might be supposed that the reverse of this process would also succeed, and that, as sands and peats are made firmer by the admixture of clay, clayey soils might be rendered more porous if sand were carted upon them. It has been, indeed, so supposed, and the attempt has been made, but no instance is known in which it has been found to succeed. The expense of laying on the large quantity of sand that would be required must probably more than swallow up any profit that could be derived; and although cold lands with retentive subsoils have, in many dis-

tricts, been much improved by covered drains, more or less effectively made, the hope of bringing them to a thoroughly free-working genial temper had been, until lately, almost abandoned. Mr. Smith, however, a manufacturer of Deanston, near Stirling, some years since applied his mind to this subject; and, as the practical farmer who has this year won the first medal of the Society states Mr. Smith's process to be the greatest improvement effected in agriculture since the introduction of turnip-culture, (that is, for the last century,) it is impossible to pass it over, although, of course, its introduction is too new to be placed already altogether beyond the risk of disappointment. Mr. Smith's mode of dealing with a clayey subsoil, which holds up in the soil the water that has fallen in rain, and thus exerts some unexplained evil influence on plants fitted for the food of man or of cattle, is as follows:—That gentleman invented a heavy iron plough, resembling the common plough, but differing in this respect, that, having no mould-board, it splits the ground, but does not turn it over; and he uses it thus:—at the same time that an ordinary plough goes along and turns over the surface of the wet land, the share of the subsoil-plough following, passes through and splits the whole of the subsoil to the depth of 18 or 20 inches, and the rain-water sinks, of course, so much lower. Mr. Smith, however, does not allow the rain to lodge here: he has previously dug covered drains about 3 feet deep, made thus deep in order that his underground-plough may have room to pass over the covered channel which is left for the water to flow along in the lower part of these drains after they have been filled in above; and he states, that in this way he can not only produce, artificially, a porous subsoil instead of a close one, but that this clayey subsoil, having been so subdivided, becomes mellowed by the action of air and of water, and that thus, after a few years, a portion of it may be safely brought up by deep or trench-ploughing, and turned over upon the surface, so that the cultivated soil, by this third process, is to the same extent deepened. To whatever extent the Deanston system may be found applicable to the clay-lands of England, a revolution will be at the same time effected in their mode of culture by the introduction of the turnip upon them.

With regard to that portion of England which lies on a stratum that may be called rocky, much of it will be found to have the immediate subsoil of clay, and to fall therefore properly under the last head; and even where the subsoil is of stone, the stone may be so interspersed with clay, that thorough draining may be equally requisite. Where that stone is a dry gravel, it may be worth the trial whether the roots of some plants cannot be enabled to descend into it by means of the subsoil-plough. Such an experiment appears, by a communication from one of our members, to

have succeeded at Heckfield.* A considerable portion of the stony soils belongs to the great chalk formation which, resting on the basis of Hampshire, flings its arms widely, in four directions, as far as the sea, through Dorsetshire, Sussex, Kent, and Yorkshire. On this extensive tract another, and singular, mode of permanently improving the texture of the soil, by blending with it a part of the subsoil, has been long and successfully, though very partially, practised. Pits, like wells, are sunk in the field, by workmen used to the business, and from the bottom of these the best sort of chalk is brought up with a windlass, to be afterwards spread over the surface; which thus, in the winter months, when the operation should take place, that the lumps of stone may be shaken to pieces by the frost, presents at a distance the aspect of a field covered with snow. The benefit of this rather expensive operation has been long acknowledged, though its mode of action has not been explained. It is less surprising, indeed, where the upper soil of the chalk formation consists of a thin layer of reddish clay, left behind by the Plastic Clay formation; but even where that soil is a shallow sheet of earth, that appears to be made up of fragments of the stone upon which it rests, this ancient practice of laying on a fresh coat of that very stone is stated to be equally advantageous. Enough, however, has now been said to prove how much remains to be done for the permanent improvement of the English soil. Indeed, while it may with truth be affirmed that our husbandry, on the large scale, stands in the first rank, as far as the surface of the ground is concerned, it must equally be admitted, as regards the subsoil, to be yet in its infancy. There is scarcely a situation where, however wet, or dry, or stony may be the natural ground, a kitchen-garden, with a bed of mould two spades deep, may not gradually be formed by the constant, long-continued care of the gardener. While the sand is stiffened, and the clay mellowed, and both deepened, the very stone is probably, by length of cultivation, worn down into soil. Nor can British husbandry be considered complete in this department until all the farms of this country, like those of Flanders, are brought into the same condition of garden-like temper and depth.

If we suppose the soil of a farm to have been provided with a free and healthy subsoil, the next subject to which the inquiry of agricultural science may be directed is the manner in which that soil should be prepared for the reception of the intended crops; but it is unnecessary to do more than to touch upon one or two of the principal heads. The most simple and ancient of rural instruments, the plough, though probably much more than

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* See the letter of Mr. Shaw Lefevre, No. V. of this Journal.

2000 years old, has recently received great improvement, and the best construction of it is even yet matter of controversy. There is no doubt that, by giving a more suitable curve to that part of it, the mould-board, which turns over the earth which has been detached with the share, and by substituting iron for wood on its surface, the friction has been so greatly diminished, that the new ploughs, being in other respects also of a far better shape, effect a diminution in draught, which may be estimated within compass at the saving of half a horse's labour on a team of three horses; and the Scotch or swing-plough is now very generally used with two horses, the ploughman holding the reins. Nothing shows more the necessity of communication among the agricultural body than that the old cumbrous machines, with a high carriage in front and two large wheels, drawn by four heavy horses, should still be retained even on the light soils of some of our southern counties. Still it is yet a question whether the advocates of the swing-plough have not gone too far when they have asserted that there is no land so stiff in which it may not be worked by a pair of horses; and it is indeed almost admitted that, on parts of the London clay formation, they have been beaten by the strength of the ground. It is even doubted whether one wheel might not be advantageously restored to the plough; and those ingenious mechanicians, the Messrs. Ransome, of Ipswich, have constructed a plough which admits of being used without a wheel, with one wheel, or with two. These doubts should be cleared up with regard to different soils by observation; and it may be worth inquiry whether ploughs of different constructions, with different amount of horse-power, may not be applicable to the same soil in various stages of cultivation, in first breaking the stubble, for instance, on heavy land, and in the cross-ploughings which follow. The other ancient implement, the harrow, is confessedly a most imperfect one, as its downward pressure is insufficient, and in the wrong direction, for cleansing from weeds the ground which it scarcely penetrates. Mr. Finlayson's harrow, however, as it is called, though in fact a new and ingenious implement, is little used by practical farmers in some of our southern counties; but this harrow, as well as the further improvement, inadequately named a scarifier, is not only efficient for cleansing the land, but may sometimes be made also to supply the place of the plough. The use of another instrument, the drill-machine, a more complicated one, by which the seed is laid in regular rows, has lately become frequent in southern as well as in northern England, though it has established itself so slowly, that, for a long time, travelling-machines of this kind have made yearly journeys from Suffolk as far as Oxfordshire, for the use of those distant farmers by whom their services are required.

But, before the seed is sown, manure must previously have been applied, either immediately or in some former stage of cultivation; and here questions large and numerous open themselves to the inquiries, and demand the experiments of a body which aims at raising the art of husbandry to the rank of a science possessing definite laws. Whether farm-yard dung should be applied, recently made or in a more advanced stage of fermentation; whether it should be laid on the field in the autumn, and covered over for the winter by ploughing alternate furrows only—a process technically known as raftering, from the ribbed appearance which it gives to the field; or should be laid on in the spring, immediately before the turnip is sown; whether its efficacy be increased by mixing it in heaps with earth, technically known as compost-heaps; whether the manure of a farm should be applied entirely to the green crops; or whether, as is a common course, recommended by the hope of immediate gain, it should be shared by the wheat; —these are all questions in the minds of practical farmers, at least—as is shown by their opposite conduct upon these heads—which the science of agriculture, if it ever become a science, is bound therefore to answer. There is also, as to the very formation of farm-manure, an important difference of management between ourselves on the one hand, and the oldest practical farmers, our neighbours the Flemings, on the other. The Flemish cattle are not allowed to run at large on the pastures, but are tied up in buildings, where they receive a daily supply of green food newly cut, and a tank is formed near at hand, which receives the runnings of the stalls, and from which the liquid manure is carried in tumbrils to the arable ground. Not only are our farm-yards managed less closely in this important particular, but, as our cattle are in the field for a great part of the twelvemonth, it may be questioned whether their droppings do not in a great degree lose their fertilising property by the action of the atmosphere as they lie scattered upon the surface. There is no doubt that, on the other hand, rank tufts of herbage are produced by the excess of manure in spots of ground upon which it falls. The advocates of the soiling system, as it is called, have acted upon that system for centuries, and they assert that a very large saving is effected by the uniform consumption of the grass, which is another result of this mode of management. A system backed by such high and ancient authority must surely deserve inquiry into its merits. This last question, however, is a double one, involving on the one side the comparative amount of fertilising substance produced for the use of the soil, and on the other the beneficial effect of the food on the condition of the animals themselves: but this second branch belongs to a distinct head of inquiry—the feeding of cattle.

There is another class, however, of manures which deserves inquiry as much as any branch of agricultural practice, and which also seems to lend itself more readily to our experiments,—those which are not produced by animals upon the farm, whether in the yard, the stall, or the fold, but which are procured by the farmer, either from the earth, lime, for instance, marl, peat-ashes, gypsum, nitre; or, as the refuse of certain trades, such as bones, rape-dust, malt-dust, even woollen rags. The former of these, which may be called the mineral manures, are now perhaps in more limited use than in past times; still, in Devonshire and some midland counties, lime is regarded as indispensable, and is carried very long distances over bad roads at a heavy expense; but marl, which was once so highly valued, is in many districts almost forgotten. Not so with the second class, which may be called the refuse manures: of these, bones in particular form a new feature in our husbandry, and their consumption is yearly increasing. In the year 1823 the declared value of all the bones imported from foreign parts was but 14,395*l.*; in 1832 it was 78,000*l.*; in 1835 it had reached 155,279*l.*; in the next year, 1836, it advanced to 171,806*l.*; and in the following year, the last of which we have any account, it amounted to no less a sum than 254,600*l.* This is the declared value, which the real value greatly exceeds; and it excludes altogether, of course, the large quantity of this article which must be produced at home. At present, bones are chiefly applied to the turnip-crop, and on some soils their effect is certain and great. Yet no single instance can show the necessity and advantage of scientific inquiry more than this new manure. It is well known that bones contain a large portion of oil, which is usually extracted by boiling; and it might naturally be supposed, since oily substances are used separately as manures, that the natural oil should at least be left in the bones, which are intended to be so applied; and farmers, accordingly, who purchase bones have complained that these had fraudulently been boiled. Now, contrary to expectation, there is reason to doubt whether the bones are not actually improved as a manure by the loss of that oil, by which, if such be the truth, their own active principle, whatever it be, would appear to be deadened and sheathed. This is a point that may be easily tested; but there are larger questions connected with the use of bones. They are, as is well known, an expensive manure, and their price is rising; but it is by no means known in what quantity they should be applied. At 10 bushels to the acre, however, if the cost be 3*s.* per bushel, the outlay is already large, namely 30*s.*, a sum probably exceeding the rent. At 20 bushels it will be 3*l.*, or 300*l.* for a field of 100 acres. But as yet there is reason to doubt whether any increased quantity beyond 25 bushels of small bones

produces any increased benefit to the crop; and no one will venture to assert that he knows the point beyond which an additional outlay is a mere loss of money and waste of a manure which is becoming daily more scarce. Again, as to the kind of soil on which bones may profitably be applied, there are some on which they have as utterly failed, as they have signally succeeded on others; but, on this important point, as on the preceding, the valuable answers returned, chiefly by practical farmers, to the questions, sent out by the Doncaster Agricultural Association, at the instance of Mr. Childers, afford the only authentic data to which we can refer at present for guidance.

After the ground has been duly prepared, there is still ample room for inquiry and for improvement. On the best season of wheat-sowing, for instance, there exists great difference of opinion amongst cultivators. Dr. Mavor, in his 'General View of the Agriculture of Berkshire,' published no longer ago than the year 1813, states that, on the chalk-hills of that county, wheat was sown as early as August. This year a practical farmer of that very district has given his opinion that it matters not how late wheat is sown, and that December is soon enough. The quantity, too, of grain to be sown is a matter of varying practice, and there are high authorities for thick sowing and for thin. Yet a saving of half a bushel of seed, if it can be properly made, will be a gain of 3*s.* per acre; or of about one-sixth of the average rent of arable land to the renter, and of 240,000 quarters, or 600,000*l.*, to the country each year. Now, this question can obviously be solved, not by loose argument, or appeals to practice, which is always appealed to while and where each practice obtains, but by careful, extended observation continued through a variety of mild and hard winters, wet and dry springs and summers. As to the quality of seed to be sown, no one can doubt that much good may here be reasonably expected from increased attention.

That well-known variety of barley, the Chevallier, is an instance in point. The discoverer, Dr. Chevallier, has obligingly sent the following account of its origin, in reply to an inquiry from our secretary:—"An extraordinary fine ear was observed and selected, by a labourer of mine, in the parish of Debenham, 1819; in the spring of 1820 I planted 27 grains in my garden: in 1825 I planted half-an-acre of this species, and half-an-acre of the common species; the land under precisely similar conditions of cultivation. The produce of the first amounted to $8\frac{1}{2}$ coombs; of the second, $6\frac{1}{2}$. The ears of the first averaged 34 grains; the second 30: the grains of the first heavier, as four to five. In the course of five or six years it was generally accepted and approved in my neighbourhood, as I promoted its fair trial, and charged only the current market-price for it."

It is less necessary to enter into detail on this source of future improvement, as the subject is fully treated in another part of this Number *; while, in the single experiment therein detailed, ground is shown for supposing that the prolificness of one species of grain, the most important, namely, wheat, differs extremely in its several varieties.

But it is not enough for the farmer to know the best management of an individual crop, even of all crops singly, unless he know also in what order of succession they should follow each other. It is by improved knowledge of this order, and a better selection, that much improvement has already been effected in British agriculture. It is well known that crops of the same kind following each other become rapidly less productive; whether by exhausting the land of some fertile property, or by depositing, as has been lately supposed, some excrementitious matter injurious to the growth of their own species, though favourable, perhaps, to the luxuriance of some other tribe. Be this as it may, no one would now think of growing, as formerly, wheat, barley, and oats in succession; and though Mr. Hitchins, land-surveyor, of Brighton, states that, in his recollection, the tenants of a gentleman living in Sussex, when a clause was introduced into their leases prohibiting them from growing *more* than *two* white crops in succession, complained that they could not hope to defray their rents if fettered by such restrictions, few good farmers at present, on light soils at least, come even up to those limits, by raising even two white crops, as they are called, in immediate succession. It is on these light lands, indeed, that a due rotation of crops has so signally succeeded, that, whereas they were formerly considered of very inferior value, they are now more readily occupied than those heavier soils, which, being in their nature more suited to the growth of wheat, were once valued more highly. And it is as much by the slow and almost insensible amelioration of such land, as by any increased breadth of cultivation, that the country has become in any degree capable of supporting the vast numbers which have been added to her population. A small parish might be pointed out, in which an aged farmer remembers the time when a single rick was all that it could produce of wheat in one year; whereas, without any increase of its ploughed ground, that same parish now yields five or six yearly. Its sandy soil was then drifted like snow before the wind, and the scanty barley might be sometimes seen borne away also; whereas the very fields, still called 'The Sands,' are now, by that glutinous quality which high condition imparts—by the droppings and the tread of the sheep which are fed on the turnips that now grow in garden-like order where before was

* See Paper VI. p. 39.

a naked fallow, compacted into a brown and adhesive, though still lightish, loam. But though the Norfolk or alternate, or four-course system of husbandry (so called because its simple rotation consists of turnips followed by barley, and clover by wheat) has conferred such great though silent benefits on the country, it may be doubted whether that system have not accomplished all that it is capable of, and must not pass into another. Already it has begun to fail in one of its green crops, probably in the other. The red clover, it is admitted, can be no longer repeated once in four years, and the substitution of white clover, or of rye-grass, in the alternate fourth year, or the prolongation of the course to five years, by sowing rye-grass with the clover, and thus leaving the ground in grass for two years successively, are but imperfect remedies. The evil, however, is likely to increase; for in Flanders, whence the red clover was originally brought over, and where the land has been longer tired with its repetition, it has been destroyed in whole districts by a grey parasitical plant called *orobanche,* and the only cure has been the entire suspension of its cultivation in those districts for many years. It is well known, also, that in Norfolk, where the turnip has been longest cultivated, that root has become subject to a disease which distorts it with unhealthy excrescences; and it may be worth inquiry whether, apart from dry seasons and the depredations of insects, the late general failure of the turnip be not in some degree owing to its too frequent repetition.

Such being the ill results of a too scanty rotation, which consists in the endless repetition of four crops, the remedy must of course be sought in a greater diversity; and here we cannot but look to that neighbouring country whence our green crops were first derived. In Flanders we find rotations, of great richness and endless diversity, carried over a term not of four years, but of ten, eleven, and even fourteen.* Into all of these potatoes enter, consumed on the farm, being in fact the chief food of the cattle during the latter part of winter and the beginning of spring. Carrots, too, are sown on the same ground with barley or pease, and after either grain is harvested, come also to maturity in the autumn of the same year. The barley-harvest, however, is much earlier than in this country. But though our summers do not certainly encourage such double culture, pease might be early enough ripe even with us to admit of its trial; but, at all events, the Flemish carrot, a white variety, may be worth cultivating as the crop of the year, since it is said to yield 22 tons by the acre, where the common orange or Dutch carrot gives but 11. "Parsnips, it appears, are grown also where the soil is too heavy for carrots,

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* See the account of Flemish Husbandry, in three Numbers lately published in the 'Library of Useful Knowledge.'

and, being extremely hardy, are left in the ground during winter, and drawn only as they are required for immediate use. They are thought not so good for milch-cows as carrots, but superior for fatting cattle.' We have long had another root, the mangel-wurzel, which may serve, if grown on a part of the turnip-field, to prevent the evils arising from the too frequent recurrence of that principal crop; and it is well known, if stored up, to come into useful service for ewes with their lambs in the spring. There is a mode which our own farmers have taken towards the doubling of crops, not indeed on one piece of ground at one time, but on one piece in the same year. Between the wheat-harvest in August, and the sowing of turnips in June, there occurs in the four-course system a gap of nine months' idleness for the soil. This interval is filled up, on a part at least of the wheat-stubbles, with a crop of rye, to be fed off green in the early spring, at the time when fresh food is most wanted for stock, and least easy to be procured. So far as this extends we have thus two crops where our forefathers left a naked fallow; and it may be worth inquiry again how far this system can be extended. But this important subject of the rotation of crops, though much may be done by individual enterprise, requires such minute attention to so complicated results spread over so long periods, that it is only on an experimental farm we can hope to see it fully investigated.

It might be supposed that when these different stages of husbandry had been successfully passed, when the subsoil of a farm had been mellowed, or rather when it had been gradually blended with the soil, and the soil itself might thus be said to have been brought to a double depth, when the surface of the field had been dressed with the most suitable manure, either natural dung, or artificial manure, whether of the mineral or refuse class, had been worked with the right implements, in the right manner, at the right time; sown with the most productive seed, and, above all, sown in the best course of rotation, when the crops thus prepared had been cleansed either by the hand or the horse-hoe (a method, this last, little known in the south of England, though long practised and approved for the turnip-crop in the north); but it might be supposed when the crops had been thus made ready, that nothing remained for the farmer but to await the fostering influence of the sky, the dropping rains and alternate sunshine, until after a joyful harvest, he should reap the reward of his toil at the neighbouring market. Little, however, does the sanguine calculator upon paper know of the farmer's real anxieties and frequent disappointments—of the blights, and rusts, and mildews; the insects, and the fungi, which falling, as if in an unseen cloud, on his fields, impair, if not destroy the vegetative power which he has so carefully and expensively endeavoured to nurture. There

is no department of agriculture in which minute inquiry is more needed than this: first, to examine accurately the various diseases of plants, and to note the habits of the animals which prey on them; then to ascertain, if possible, the remedies that may be applied; and the followers of kindred sciences may be fairly invited to aid us in the formation of this branch of knowledge, which may be called agricultural pathology. But even when the crop is ready for harvest, it must not be supposed that there is no doubt remaining, no room for further improvement. With regard to corn, much injury arises to it from its being exposed to wet after it has been cut, when it may be discoloured at least, and often begins to grow in the sward or the sheaf. If left too long, on the other hand, in the hope of dry weather, it becomes overripe, and a portion of the grain is lost by being shed on the ground. It is no new remark, however, that as soon as any portion of the straw has turned yellow, the ascent of sap from the root is cut off, and that though the ear be partly green, it will ripen henceforth as well when severed from the ground as it will if it be left standing. If this supposition be correct, it might enable the business of harvest to be commenced earlier, when a clear sky invites the reaper into the wheat-field; and would be so far beneficial, though not in a very material degree. The late ripening of the corn in the northern parts of this island, where from the moisture of the summers following cold springs, crops are sometimes not secured for two months after our southern harvest is ended, requires a more effectual remedy if such can be found; and it has been suggested, that as seed grown in southern climates retains for some time its habits of early ripeness, though grown under the more chilly sun of the north, seed might be advantageously borrowed by our northern farmers from the warmer parts of the country. The suggestion, however, can be regarded as yet merely as speculative. But the power of improvement does not cease when the corn is placed in the rickyard; and here we have not to inquire or to guess, but simply to look at the practice of the practical farmer in the Lothians and in Northumberland. There, instead of the thresher and his flail, may be seen the machine, not driven however by horses, for then the advantage might be more doubtful, seeing that the labour is distressing to the animals, and withdraws them, moreover, from the work of the fields, but impelled by wind or water, or steam, and that on almost every farm. In France, too, it appears that not only travelling threshing-machines are employed, as is the case here, but that it is proposed to work these by steam-engines carried with them. It may be objected, indeed, by the farmer, that if he gave up his hand-threshing, he would be at a loss to find employment for his men in the winter. The objection, however, shows a want of confidence in the power

of permanent improvement judiciously applied on the soil to bring back its cost with interest, nor can this objection be allowed any weight as long as a single acre of the farm is stagnant with water, or dry because the soil is shallow, while there is a possibility of its being deepened. Indeed, if you once establish a moving power on your farm, whether steam, water, or wind, it is not the labour only of threshing that may be saved to men or horses, but the winnowing, the dressing, the chaff-cutting; even the turnip-slicing machine, when the turnip is consumed at home, may be grafted on to the principal wheels, and thus borrow their motion. The more labour is thus set free from mere work of routine, the more will be applied to the further improvement of the parent of all agricultural labour, the soil. Having mentioned the turnip-slicer, we cannot but say that, while we would willingly rest the necessity for increased intercourse among the agricultural body, upon the varying practices which prevail in different parts of England with regard to the turnip alone, a strong argument may be drawn for it from the limited use even of this implement only. It consists in some simple machinery of knives, turned by a handle, enclosed within a box, above which is a trough into which the whole turnips are placed, and below which the slices fall into another receptacle: the whole may be placed on a wheel and two legs, and moved about the field like a wheelbarrow. The advantage is two-fold, saving the teeth of the old ewes, for which the Swedish turnips, especially, are too hard; saving the waste of this valuable root, which, when partially scooped out by the sheep, is rotted and trampled about with great waste. The economy effected by this simple machine, which costs but 6 or £7., has been stated to us by an authority which would at once be admitted as very high, to be no less than one-third of the whole produce. If it be taken, however, only at a fourth or a fifth, why, it may be asked, has not every farm in the country been long since furnished with this cheap apparatus? If a contrivance were discovered in Manchester which should save one-fifth of the cotton consumed in a manufacture (were such a saving possible) not a year would pass before most of the old machinery would be replaced by the new, and such changes are constantly taking place there, at the expense of many thousand pounds; but the turnip is the raw material of the farmer's stock, and the farmer is of the same enterprising race with the manufacturer: why, then, but on account of the separate and secluded scene of his industry, is the spread of agricultural inventions so slow—the extension of those which concern manufactures, so rapid; and what but a central connection of the cultivators of the soil can diminish the distance and remove the obstruction?

The mention of this last instrument has brought us to a most

essential element of farming, that we have hitherto passed by,—the animals which, while they embellish and enliven rural scenery, are indispensable to the fruitfulness of the soil. It is a subject which the English agriculturist may enter upon with satisfaction. There seems indeed to be in the people of this country a peculiar disposition and talent for encouraging the finest animal forms, and producing, by careful attention to the selection of the parents, new families, in which are perpetuated, by descent, useful and symmetrical excellence. It is not only the English race-horse, improved from the Arab and Barb, that is eagerly purchased and exported to every civilised country, but the Durham bull (like him too supposed to be descended from a foreign ancestor, derived in this case from Holland), the new Leicester sheep, and even the Berkshire hog, are the acknowledged sources from which other nations seek to enrich and refine the blood of their several live-stock. National gratitude requires that, whenever the new Leicester sheep is mentioned, the name of Mr. Bakewell, of Dishley, by whom it was produced, about a century since, from unknown parents, should not be forgotten; nor that of Mr. Colling, in connexion with our beautiful short-horns. This indeed has been the popular branch of English farming, and among its zealous patrons may be named the late and present Dukes of Bedford, the Duke of Richmond, the Marquis of Exeter, Lord Leicester, and Lord Spencer. Such indeed is the pleasure of seeing the form of the sire reproduced or excelled in the offspring (and the coins of the Sicilian Greeks show how fine is the form of the bull), that there is some danger lest the end pursued should be forgotten in the means of attaining it. Not that it can be necessary in an Agricultural Journal to vindicate our annual shows of fat cattle, since, although those cattle may be more fat than the ordinary market requires, the power of reaching that excessive size is the only test by which the capacity for acquiring useful marketable condition, at the cheapest expense of food and at the earliest age, can be tried under the encouragement of public emulation and competition. That object has been also practically attained to a high degree. The saving effected in the cost of production, through the early maturity of the new Leicester sheep, or of the cross between the new Leicester and Cotswold, has been calculated, by a practical farmer in Gloucestershire, at nearly 20 per cent.; that is to say, it would have cost about one quarter of the outlay more to supply the present quantity of mutton consumed in this country under the old system than by the new. This may be taken as a moderate estimate, so far as the new Leicester blood and its propensity to early fatness has hitherto extended. It may be worth the inquiry how far the South Down race has been improved in

this respect, or how far it may be capable of such improvement, and of thus combining rapid maturity with its own superior hardihood. There can be no doubt, however, that in many of our agricultural districts the pure improved blood, whether of sheep or cattle, is little known; and the extension of the advantages secured by the stage of perfection to which these animals have already been carried into such districts will arise, it may be hoped, from the Society's cattle-shows.

There is another point connected with cattle, on which the extension of our present knowledge, as practised in the northern districts, and inquiry as to the possibility of further improvement upon those practices, appears extremely desirable: this is the feeding of stock. In our southern counties the arable farm is kept in heart chiefly by the manure of the sheep-flocks, such flocks indeed as no arable farms can produce but in this country. The beasts kept during winter in the yard, sometimes poorly fed, and only not losing condition, trample the straw until it has the appearance, though it often possesses little of the virtues, of dung. On well-managed northern arable-farms, on the contrary, the cattle are tied up in the yard to be fattened, and are fed not only on turnips, but on large quantities of oil-cake, purchased at the expense often of many hundred pounds by the farmer. Now it is well known that the better the beast is fed, the more valuable is the manure produced, and that by oil-cake in particular its fertilising power is almost doubled. Interesting experiments have been made, at the instance of the Highland Society, with a view to ascertain the relative value of food in the stall-feeding of cattle; but much remains doubtless to be cleared up by experiments yet to be made. It may even be worth inquiry whether, on farms where fattening of stock is largely carried on, a somewhat harder course of cropping might not be permitted, without fear of impoverishment to the land. Pease, for example, and, on some ground, potatoes, are a scourging crop; but, if the pease, instead of being carried to market, are given to the farmer's stock, it may be a question whether the superiority of the manure may not more than compensate to the farm the previous loss of condition which the crop has occasioned. On this subject of feeding, it is impossible to pass over that heavy article of the farmer's expenses—the keep of farm-horses. Here, however, it will be sufficient to make a short extract from the printed Report of a club of practical farmers, who have for some time met at Harleston, in Suffolk, for the excellent purpose of discussing doubtful points of agricultural science. It will not be useless, however, first to give a list of the subjects which they had selected for the last year's inquiry, since it shows the spirit of improvement which is at work in the agricultural body.

"On the use of saltpetre as a manure.
On the management and cheapest method of keeping farm-horses.
On spade-husbandry.
On the best method of improving neat-cattle in the district.
On shoeing horses.
On stall-feeding.
On the best method of keeping farming accounts.
Whether or not it is beneficial to consume by stock any part of the straw the produce of the farm.
On chaff-cutting."

With respect, however, to our immediate subject, the Report of the Harleston Farmers, as it stands in the 'Mark-Lane Express,' Feb. 11th, runs as follows:—"Your Committee, in common with every member of the club, was astonished to find that, amongst a body of farmers, all residing within four or five miles of the place of meeting, all using a similar breed of cart-horses, and cultivating a similar description of land, such an astonishing difference in the expense of maintaining their cart-horses should exist, amounting, in authenticated statements, to upwards of 50 per cent., whether estimated at per head for each cart-horse, or per acre for the arable land." That is to say, not only, with an equal number of acres to plough, the horses of one farmer cost twice as much as those of another; in which case the difference might arise partly from the different number of working cattle maintained; upon which a second question would arise,—which farmer had too many, or which had too few?—but also the very same number of horses stood in to one farmer at double the expense which they did to the other. "What greater proof," the Harleston Committee very properly ask, "could be required of the necessity for discussion?—and if no other subject had ever been brought before your club, we are of opinion, that by debating this question alone it would have rendered incalculable benefit to the neighbourhood; for what member, who now learned for the first time that his neighbour was cultivating his land at much less cost than himself in one of the heaviest items in a farmer's expenses, but would go home and improve on his farm management?"

It appears then, even from the superficial survey contained in these few pages, that the practice of farmers varies greatly, in different parts of this country, on points where there is no question which practice is best. But it appears also that there are innumerable points of farming on which no one ought to give a positive answer, because no certain knowledge exists. How then is such certainty to be obtained on a matter which involves so large a national profit and loss? Surely, as in other sciences, by careful observation and well-considered experiment. But in many sciences this process, however difficult, is at least within the

reach of every inquirer. The chemist requires but a room in which to set up his furnace, and evolve his gases: not so the agricultural inquirer; he requires a large farm (for a small one would be insufficient), and a large capital, too, practically engaged in its cultivation. Neither would one farm be sufficient, since the results of its treatment would apply to one soil only, and subsoil, one climate and elevation; whereas there are, even in this country, many soils and subsoils, climates and elevations; and it can scarcely be expected that, either by individual or by public means, such farms should ever be provided in such number. Still, if we wish, as agriculturists, instead of uncertain local rules of practice, unknown beyond the districts in which they are severally handed down, to attain the knowledge of general certain laws, not less certain because liable to many equally certain local exceptions,—that is to say, if we wish to raise our important art to the rank of a science, this difficulty must be overcome. After all, however, it is not a difficulty with which we alone have to cope. On the contrary, botany, geology, and other sciences which might be named, depend equally upon the collection of numerous minute facts, by individual observers, over a large surface, even that of the whole globe. But it has been found, in these and in many departments of knowledge, that by the formation of permanent societies, having the promotion of the particular science for their special object, great progress has been attained. Such a society, by bringing together men who are already desirous of a common end, encourages their zeal, and attracts other labourers into the field. It also regulates their endeavours, as their mutual intercourse shows them more clearly the points of doubt which particularly require to be cleared up. Further, such a society, as it spreads forth its branches, provides a scattered but disciplined host of observers and pioneers. Lastly, the facts thus obtained are recorded, and gradually accumulate, until, by careful comparison of the points in which they agree, some general rule is discovered; and, of those in which they differ, the exceptions are also found, and the causes of those exceptions. It is thus that geology has grown into a science within the present century. It may be said, indeed, that the labour of observation on so minute and extended a scale is great, and the prospect of practical improvement, at best, problematical. It might be asked, in reply to such spiritless objections, why agriculture should be the only science in which patient pursuit of knowledge found no reward?—or whether, while the philosopher, from mere love of science, seeking, for instance, to learn the fixed causes which govern the most changeful and seemingly accidental of all natural things, notes down daily, from year to year, the shiftings of the wind and the rise or fall of the weather-glass, hoping that

at last he may be able to arrange these endless vicissitudes under some regular system, and thereby know of a certainty the signs of the sky—we, the owners and occupiers of the land, on a matter wherein we have a strong interest, in which the whole nation, as consumers, and many millions as labourers, have an interest also, on a matter too in which so much improvement has been long ago made, so much is still making, and so much is in prospect, should alone be so faint-hearted, or so short-sighted, as to doubt that, by our combined exertions, the bounds of our own science may be enlarged; and that, besides this hope, which is sufficient for the followers of other sciences, we may at the same time advance our own interests, give more bread—not to our loss, but with our own gain—to our dependent workmen, and strengthen at the same time the country's resources?

But such arguments are not needed. On the contrary, there are proofs on all sides, whether in the weekly increase of this Society's numbers, in the local societies which are springing up in every county, in the farmers' clubs which are being formed, the new machines which are invented, new manures, and new varieties of seed which are announced—above all, and practically, in the improving face of the country; which show that the British farmer is not liable to the charge of being blindly attached to ancient practice, but is ready, with the caution however which befits a man whose livelihood is in agriculture, as well as his pleasure, to adopt improvements in his art, and even to seek for them—that the spirit of inquiry is afloat—that this Society is formed therefore in an auspicious time, and does but represent the wishes of those whom it seeks to unite in the road of knowledge, which they are already disposed to pursue, and that its exertions will be engaged, not so much in stimulating as in methodizing the general desire for improvement. How we may best combine and order the separate efforts of our individual members, on the details of whose exertions, duly combined, in the various paths of our diversified art, to a common end—and carefully and honestly made known to our body, our slow but steady progress will mainly depend—must form the future subject of our common consideration.

II.—*On the Selection of Male Animals in the Breeding of Cattle and Sheep,* by the Right Hon. Earl Spencer, President of the Society. Read February 20th, 1839.

More from wishing to set an example to others, than from any hope that what I myself can suggest will be practically useful, I submit to the English Agricultural Society the results of my experience in an important part of that division of farming, to which my own attention has been particularly applied,—I mean the breeding of stock. The part to which the following observations apply is the selection of male animals. A large proportion of farmers breed sheep and several breed cattle; to all who breed either this subject is one of great importance.

The object of a certain number is to breed bulls or rams for the purpose of selling or letting them, but that of the majority is to breed oxen or wethers for the purpose of grazing. The first of these classes is very well aware of the importance of selecting good male animals, and profess to spare no trouble and to be very indifferent as to the expense which they incur in obtaining them; but with respect to those whose object it is only to breed oxen or wethers, I am afraid the case is generally very different, and they take very little trouble and expend as little money as possible in procuring the male animals to which they put their females; that is, they consider as a matter of indifference that on which the profitable or unprofitable nature of their occupation mainly depends.

It is admitted by every one that the bodily and constitutional qualities of the offspring are usually similar to those of the parents, either combining in various proportions the qualities of both parents, or taking entirely after one. I should say, as respects cattle and sheep, that, in most cases, the qualities of the male parent predominate in the offspring. I have also observed that the worse-bred the female is, the more will this be the case when she is put to a well-bred male. This observation was first made, I believe, by the late Mr. Berry, in an essay, for which he received a prize from the Highland Society. He accounted for it thus: a well-bred animal means one whose ancestors for several successive generations have all been good, that is, have all possessed the peculiarities in constitution and shape which it is the object of experienced graziers to obtain in their stock. The characteristic, therefore, of the family of such an animal will be such peculiarities; but the ancestors of a badly-bred animal will probably have varied in every possible way, and therefore there will be no distinguishing characteristic in its family; it is consequently most probable that the offspring produced from a cross between two animals so circumstanced will be more like the one in whose family there is a distinguishing characteristic, than the one in whose family no such characteristic

exists. The common but, I believe, mistaken notion, that the offspring from the first cross is better than that from any subsequent one, probably arises from the improvement in the first instance being so much more apparent than, for the reason given above, it is likely to be in any one generation afterwards. Now it is known to all graziers that the attempt to fatten an animal, who possesses no feeding propensities, produces loss instead of profit. If the above observations are correct, the feeding propensities descend from the sire; it is quite just, therefore, to say that a breeder of cattle or sheep, who considers it a matter of indifference what sort of male animal he uses, does consider it a matter of indifference whether he gains profit or incurs loss.

The first object which any breeder of cattle or sheep must keep in view, whether he intends to breed bulls or rams, or whether his aim is merely to breed oxen or wethers, is that the stock which he breeds shall be healthy. The first thing, therefore, to be considered in the selection of a male animal are the indications by which it may be possible to form a judgment as to his constitution. In all animals a wide chest indicates strength of constitution, and there can be no doubt that this is the point of shape to which it is most material for any breeder to look in the selection either of a bull or a ram. In order to ascertain that the chest of these animals is wide, it is not sufficient to observe that they have wide bosoms, but the width which is perceived by looking at them in the front should be continued along the brisket, which ought to shew great fulness in the part which is just under the elbows; it is also necessary that they should be what is called thick through the heart. Another indication of a good constitution is, that a male animal should have a masculine appearance; with this view a certain degree of coarseness is by no means objectionable, but this coarseness should not be such as would be likely to show itself in a castrated animal, because it thus might happen that the oxen or wethers produced from such a sire would be coarse also, which in them would be a fault. Another point to be attended to, not merely as an indication of a good constitution but as a merit in itself, is that an animal should exhibit great muscular power, or rather that his muscles should be large. This is an usual accompaniment of strength of constitution, but it also shows that there will be a good proportionate mixture of lean and fat in the meat produced from the animal; the muscles being that part which in meat is lean. A thick neck is in both bulls and rams a proof of the muscles being large, and there can hardly be a greater fault in the shape of a male animal, of either sort, than his having a thin neck. I am inclined to say, that in the new Leicester breed of sheep, which is the breed to which I am accustomed, a ram's neck cannot be too thick. Other indications of muscle are more difficult to observe in sheep than in cattle.

In a bull there ought to be a full muscle on each side of the backbone, just behind the top of the shoulder-blades; he ought also to have the muscles on the outside of the thigh full, and extending down nearly to the hough. It will seldom happen that a bull having these indications will be found deficient in muscle. With respect to rams, my own observation does not enable me to point out any other indications of muscle except the thickness of the neck, which I have mentioned above; if other farmers are able to point out any, I would only say there is scarcely any thing to which they ought to pay greater attention.

As I am writing for the use of farmers, it is quite unnecessary for me to attempt to give a description of what is considered a well-shaped bull or ram; it is also obviously impossible to express in words what is meant by good handling. It is sufficient to say, therefore, that no male animal is fit to be used at all as a sire whose handling is not good, and that the more perfect his shape is the better. The above observations apply to breeding generally; for, whatever may be the sort or size of the animal intended to be produced, there is no doubt but that good health, propensity to fatten, and good shape, in all cases, ought to be aimed at. But there are not only different breeds, both of cattle and sheep, but experienced and very good farmers differ very much in opinion as to which peculiarities of shape and size are to be preferred, even among animals of the same breed. It is therefore very desirable, before any man commences to breed either cattle or sheep, that he should make up his mind as to the shape and qualities he wishes to obtain, and steadily pursue this object; if he does so, there is very little doubt but that he will succeed in having a herd of cattle or a flock of sheep possessing the characteristics which he at first intended they should possess; but if, on the other hand, he breeds at one time with the view of obtaining animals possessing one sort of shape, and at another time with the view of obtaining animals possessing a different sort of shape, the probability is, that his stock will possess neither the one nor the other in any degree of perfection. Having made this decision, he should take care that the individual male animal which he uses shall possess the qualities which he requires. In addition to this, it is of great importance that these qualities should have been characteristic of the family from which the animal is descended; and if he is old enough to have been the sire of any number of offspring, it is of a great deal more importance still that they should possess them. Because all the perfections of shape and quality which the best judge may wish to find in a male animal are, after all, only indications of what the stock got by him will probably be: the seeing, therefore, what they really are is much more satisfactory.

There are few breeders, of cattle more especially, who breed

upon so large a scale as to enable them to keep many male animals at the same time in use. A man, therefore, can usually only look at the general qualities of the females which he possesses, and observe what are the faults most prevalent among them: these he should be particularly careful to avoid in the male which he intends to use. It is sometimes said that a male animal ought to have no faults, and undoubtedly it would be very desirable that this should be the case; but, unfortunately, no such animal exists. All a man can do, therefore, is, to avoid putting a male and female together whose imperfections are the same, so as not to increase the fault already existing in his stock. If a man breeds upon a large scale, and uses several males at the same time, he can, of course, attend to this more effectually than if he uses only one. In this case, he should select and put together the males and females individually, so as to endeavour to correct any imperfections which either of them shew. Most breeders of sheep, indeed, do use more than one ram, and all who pretend to take any pains in improving their flock divide their ewes, so as to put them with the ram who will most probably effect this object. I need not say that those (some of whom, I am sorry to say, still exist) who turn two or three rams of different shapes and qualities into a field with all their ewes, without attempting to make any selection among them, have no right to expect to be successful breeders; and if they do expect it, will certainly be disappointed. I believe the general opinion of breeders is, that it is disadvantageous to endeavour to correct any fault in the shape of a female by putting a male to her who possesses, in extraordinary perfection, the merit in which she is deficient, but who in some other part of his shape is faulty. My experience leads me to say that this mode of endeavouring to correct a fault is frequently successful. It would be better that none of the females from which a man intends to breed should be faulty in shape to any considerable degree, but it almost always will happen that some animals, possessing an excellent constitution, good blood, and a great propensity to fatten, and therefore such as the owner would very unwillingly cull, will fail decidedly in some part of their shape. I would say that, when this is the case, it is worth while to try the experiment of putting to them a male remarkable for his perfection in this failing part; and, in my opinion, such a male will be more likely to correct the fault, than one who shows no one part of his shape very superior to the rest. The late Mr. Chine, whose eminence as a surgeon is very well known, published a tract upon the breeding of domestic animals, which contained, as might be expected, most valuable information. His suggestions are such as ought to be very carefully attended to; but it is probable that his meaning has been mistaken in one recommendation which he gives, namely, that in which he is understood

to say that it is always desirable that the male should be smaller than the female. When he makes this observation he is speaking of the crossing of different breeds, and probably only means that in a cross between a large breed and a small one, the male should be taken from the small breed, and the female from the large one. It is hardly possible that he intended to say that in the same breed the male ought to be smaller than the female, because this is contrary to the practice of nature. In every description of land animal with which I am acquainted the males are of a larger size than the females. The attempt also to follow this advice would undoubtedly, in a few generations, so very much reduce the size both of males and females, as considerably to diminish their value. I can say, from my own experience, that some of the best-shaped animals which I have bred have been produced by following a contrary course. I prefer breeding from large females; but if I do breed from one which I think too small, I put to her the largest male of good shape that I possess. As one instance among several to prove that this course may be successful, the ox which I showed in the fourth class, at the last Smithfield show, and which obtained the prize in that class, was by the largest bull I have, from a cow so small, that I culled her after she had bred that one calf. It must be admitted that the theoretical reasoning which Mr. Chine adduces in support of this recommendation appears to be very conclusive; but, even in the restricted sense in which I understand it, there is some doubt whether it is practically correct. The most successful cross between two different breeds of cattle, of which I am aware, was the one between a Durham bull and a Galloway Scotch cow, made by Mr. Charles Colling. The produce from this cross sold for enormous prices at his sale, and at the present day a majority of the best short-horned cattle are descended from it. My opinion, then, the result of my own practical experience, is, that if a man considers the female animals which he possesses to be smaller than he wishes, he may safely put them to a male of large size, provided he is well-bred, of good quality, and is well-shaped. But I am bound to add, that I know, in giving this opinion, I differ from the most skilful and successful breeders with whom I am acquainted.

It follows from the above observations, if they are correct, that the first and most indispensable object which all breeders must try to obtain, whatever may be the sort of animals they wish to have, whatever may be the shape or size they prefer, is that the male animal which they select shall possess a strong and healthy constitution. This is absolutely essential; but it is also most conducive to their success that they shall, after due consideration, make up their minds as to the qualities which they wish their stock to possess; that, having made this decision, they shall steadily pursue

the object they have in view, and endeavour to select such males as shall be likely to get offspring possessing these qualities; that they shall carefully and candidly examine the females from which they intend to breed, observe the faults in shape or quality which prevail among them, and select males who shall possess corresponding perfections. That the safest mode of ascertaining what are likely to be the qualities of the produce from a male in future is, where there is the opportunity, to see what are the qualities of the offspring already produced from them; then, the next to this is, to observe what are the qualities of the family to which he belongs; and that in the case of not having the opportunity of making use of either of these guides, they may assume that it is probable that the qualities of the individual himself, which in all cases ought to be attended to, will, if he is well-bred, descend to his offspring.

It has already been said that there are two classes among the farmers who breed cattle and sheep; the one, of those who breed bulls or rams, and the other, of those who breed oxen or wethers for the purpose of grazing only: the above observations are intended to apply to both. But much more attention ought to be paid by the first of these classes to the selection of the animals from which they breed than is absolutely necessary in the other. This is essential to their own interest, because a male animal very often shows faults in his shape, which, if he had been castrated, would not have appeared. It frequently, therefore, happens that the produce from a bull or a ram may prove excellent cattle or sheep for grazing purposes only, but may be totally unfit to be kept as the sires of future stock. Their duty, also, to those who hire or buy from them imposes upon them the obligation to pay the strictest and most minute attention to the qualities of their male animals; more particularly, they are bound not to offer to their customers any one, of the health of which they have any reason whatever to doubt, whether this doubt arises from any weakness of constitution, which may have appeared in the individual himself, or whether it arises from their knowledge of the family from which he is descended. They are bound, also, not to keep as males any animals who are not perfectly well-bred. It does not follow from this, that a long pedigree is in all cases necessary, although it is generally desirable; but it sometimes happens that a female, of whose pedigree the owner is ignorant, will have produced offspring which have all possessed extraordinary merit, and which have proved themselves good breeders also: a male descended from such a female may be considered perfectly well-bred on her side; and will, very possibly, prove a better sire than many whose pedigree on paper is much longer.

In paying this minute attention to their occupation, the breeders of male animals have some advantages not possessed by others;

they have generally the opportunity of knowing accurately what are the characteristics of the families of the animals from which they breed, an opportunity not possessed by those who breed only for grazing purposes. In order to make a proper use of this advantage, they ought to keep accurate pedigrees of their cattle and of their sheep, and as far as possible, when they put the males and females together, recollect what have been the respective qualities of the ancestors of each. They have also the opportunity, by using a male cautiously at an early age, of knowing, by experiment, whether the stock produced from him is good or bad, before they run the risk of injuring their stock materially by using him largely. This may be ascertained with sufficient accuracy, when the produce are very young; for an experienced breeder can judge with tolerable certainty what will be the shape of a calf or a lamb when it grows up by seeing it soon after it is born, and before it has begun to lay on fat. Nor is it necessary to see many of the produce for the purpose of deciding what its general characteristics will probably be. I admit that in saying this I am speaking more from my experience as a breeder of cattle, than a breeder of sheep but I believe the same observations will apply to both. It is certain, however, that seeing four or five calves from a bull ought to be a sufficient guide to the breeder as to whether he will be valuable as a sire or not. Unless there is a family likeness which generally pervades through the produce from a bull, although he may be valuable as the sire of oxen, it will not be safe to use him as the sire of bulls. The seeing, therefore, four or five calves will prove to the breeder whether there is such a family likeness among them, and whether it exhibits itself in such qualities as indicate that when they grow up they will be valuable animals.

There is one failing to which all breeders are liable, but to which the breeder of male animals, from the greater interest attached to his occupation, is more peculiarly liable, and against which he ought most carefully to guard himself; this is, too great a partiality for animals bred by himself. In order to guard against this, he ought to occupy himself more in looking for faults than in discovering merits in his stock, he ought to listen to every criticism he hears made upon them, even by those whose judgment he does not hold in high estimation—not, of course, with the view of being satisfied at once that the criticism is correct, but with the view of satisfying himself, by accurate and candid examination, whether it is so or not; and he ought frequently to see the stock belonging to other breeders, and fairly compare its merits with those of his own.

I think it most probable that in the foregoing observations nothing will be found which will give new and useful information to practical farmers; but I have been induced to submit them to the English Agricultural Society, because I conceive that one of

the great objects of that society is the diffusion of knowledge connected with every branch of farming. The best way in which it can be enabled to effect this object, is by those of its members who have paid attention to any of the divisions of farming operations communicating to the Society the results of their practice and experience. It will then be for the Society to circulate, by any means in their power, such of these communications as it shall appear to them are likely to be useful to those engaged in the cultivation of the land. With this view I place this paper at their disposal.

III.—*On the Deanston frequent Drain System, as distinguished from and compared with the Furrow-Draining and Deep-Ploughing of the Midland Counties of England.* In a Letter to the Editor. By the Right Hon. Sir JAMES GRAHAM, Bart., M.P., F.R.S., &c. Read Feb. 20, 1839.

SIR,

A recent inquiry addressed to me by Lord Spencer relative to the "Deanston frequent Drain System," induces me to believe that I may render some service to agriculture, if I am so fortunate as to direct the attention of your readers to this important subject at this particular time.

The great object of our quarterly publication is, as I conceive, the establishment of an authentic record of practical experiments; and by multiplying facts and proofs of this description agriculture will be treated as a science, and will advance, and the Transactions of our Society will become the depository of useful information, verified by the name and the address of the several correspondents.

Mr. Smith, of Deanston, in the county of Perth, was examined as a witness before the Agricultural Committee in 1836. He gave a detailed account of his system of draining, which very much resembles the furrow-draining of the midland counties of England, except that at Deanston, stone being on the ground, the drains are made with stones and not with tiles; and at Deanston the cover of the drain is 22 inches below the surface; whereas in Leicestershire and Northamptonshire the top of the tile in the furrow is not so deeply laid. Mr. Smith, when his land is effectually drained, lays it down without a furrow; in the midland counties the furrow is carefully preserved.

Mr. Smith, after draining, for the first rotation at least, does not bring to the surface any of the subsoil; but by a plough of his own invention, which follows a common plough turning up the surface, he penetrates the subsoil to the depth of 20 inches, and

breaks and pulverizes the lower crust without bringing it to the top. This subsoil-plough, such as Mr. Smith has used, is a heavy implement, requiring the draught of four, six, or eight horses, according to the tenacity and strength of the substratum.

Mr. Smith contends that the subsoil, by being moved, becomes pervious both to air and moisture; that the efficacy of the drains is thus perfected and perpetuated; and that the character of the subsoil itself, when relieved from superfluous moisture, and open to atmospheric influence, is entirely changed; that it becomes mellow and friable; and after one rotation, or a lapse of five years, that it may be brought to the top, by deep ploughing, with safety and propriety, and be mixed with the surface-soil to great advantage.

In the midland counties of England, deep ploughing after furrow-draining has been the constant practice; but the use of six horses in a subsoil-plough is a novelty in Scotland. In England a portion of the subsoil is raised at once to the top: at Deanston the subsoil, though broken, is not so raised; and here the important question arises, When land is effectually underdrained, which is the right treatment of the subsoil? Will you bring a portion of it immediately to the surface by deep ploughing, or will you, with Mr. Smith, delay this operation for some years, until the subsoil shall have been mellowed, after having been broken and penetrated by the atmosphere?

The advantages of the wide circulation of agricultural knowledge of the multiplication of experiments, and of the interchange both of theory and practice between Scotland and England, will here develop themselves in the clearest light. Furrow-draining and deep-ploughing have been practised in England for half a century; yet the introduction of an analogous system into Scotland is regarded almost as a discovery. But in Scotland itself the greatest difference of opinion prevails on the question of turning up or only moving the subsoil after draining. Some of the greatest authorities in East Lothian differ from Mr. Smith, and lean to the English practice. In the first furrow for green crop after draining, by two ploughs following each other, which is equivalent to trench-ploughing, they go down to the depth of 12 or 14 inches, and bring up a certain quantity of virgin soil.

It is obvious that this difference of practice in the treatment of the subsoil involves a most important question, which can only be solved by accurate and multiplied experiments. The outlay of capital, which is common to both plans, consists in effectual under-draining; and no subsequent management, no fresh application of capital, can be of any avail, unless, on retentive soils or a substratum of clay, the water be quickly carried off. This I take to be an axiom undisputed in agriculture: but after effectual draining, when

the outlay has been incurred, the mode of treating the subsoil affects only production, and does not involve expenditure; and greater produce without additional outlay is the grand object of the practical farmer.

We have seen that in draining Mr. Smith uses stones, because he has them on the spot. Tiles are substituted in the midland counties of England, because stones cannot be obtained easily, and because in the clay districts tiles are cheaply and easily manufactured.

It has always appeared to me that skill in agriculture does not so much consist in the discovery of principles of universal application, as in the adaptation of acknowledged principles to local circumstances.

The peculiarities of soil and climate, what nature gives or nature withholds in each particular district, must be carefully considered and judiciously investigated, before any given experiment, though locally successful, can be pronounced to be generally useful or universally applicable. The neglect of this consideration has brought agricultural experiments into disrepute, on account of the heavy losses which they have occasioned. If the record now opened in these Transactions be faithfully kept, this evil will be averted; for I hope that each experiment detailed will be authenticated by the name of the party who makes it, and that every local circumstance of a peculiar character will be carefully particularized.

My attention having been thus directed to the various treatment of subsoils after under-draining, I tried an experiment, in the year 1838, on a field of about 8 acres of the poorest and wettest land. The surface soil is about 5 inches deep of black earth of a peaty quality: the subsoil is a weeping retentive clay with sand and rusty gravel intermixed. This clay goes down to the bottom of the drains, which are of tile, laid 30 inches deep, in every furrow.* This field is in a farm lately taken into my own hands, and was rented by the out-going tenant at 4*s.* 6*d.* an acre. It was in pasture of the coarsest description, overrun with rushes and other aquatic plants.

After draining, on one-half of this field, I used Mr. Smith's subsoil-plough; on the other half I trench-ploughed to the depth of 10 inches by two ploughs following in succession: in the first part not mixing with the surface any of the subsoil, in the last part commingling the surface and the subsoil in nearly equal proportions. The whole field was heavily but equally manured and planted with potatoes; and though the potato-crop, even on good land, in this

* The size of the tiles used was 6 inches for the main drains, and 3 inches for the common drains. The tile-drains were laid 10 yards apart.

neighbourhood, was below an average, yet the crop in this field exceeded an average, and yielded about 12 tons per acre. The field is equally drained in every part. I filled up the tile-drains with porous materials, such as stones, moor-turf reversed, and tops of thinnings of young plantations, to the exclusion of the retentive clay which held the water. The crop of potatoes was so equal throughout the field, that I am unable to pronounce positively which part was the best; but I am inclined to give the preference to that portion where Mr. Smith's subsoil-plough was used. Since the potatoes were taken up the land has not been ploughed or ridged up, but remains perfectly flat; and I observe, where Mr. Smith's subsoil-plough was used, that no water whatever, notwithstanding the wetness of the season, has stood upon the land; where trench-ploughing was adopted, and a portion of the clay brought to the surface, after heavy falls of rain the water has stood for a time in hollow places; and here the land, in consequence, would seem to be rather soured. The field will be sown out this spring with oats and grass-seeds, and I shall watch with anxiety the future effect of the past different treatment.

In the mean time I have relet the farm: the outlay in draining and extra ploughing cost me £6. 18*s*. 4*d*. an acre;* but the field in question, which was valued at 4*s*. 6*d*. an acre to the out-going tenant, is rented by the in-coming tenant at 20*s*. an acre on a lease of 14 years.

On a small field of very retentive clay, of an hungry and bastard kind, intermixed with rusty gravel, I tried, six years ago, the experiment of trenching with the spade after close and careful draining; I buried the surface soil, which was poor and exhausted, and I brought the subsoil to the top from the depth of 18 inches. I limed this land and sowed it out with rape and grass seeds. It has been very unproductive ever since, and all my expenditure upon it, hitherto, has been thrown away; for, though dry, it bears no more grass than before the draining. I think, however, that the surface-soil is now mellowed by exposure to the atmosphere; and I am

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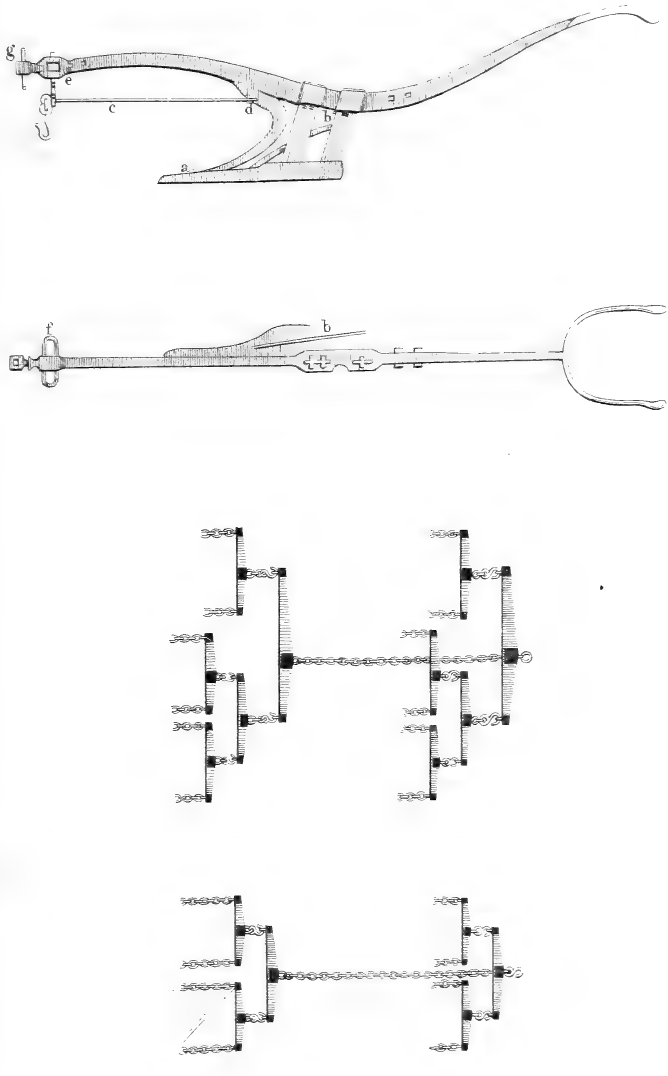
	£.	s.	d.
* 70 roods of draining, cutting, laying the tiles, and upfilling, at 4d. per rood	1	3	4
1500 tiles per acre, at 30s. per thousand	2	5	0
Carriage of do. 6s. do.	0	9	0
Do. of turf, &c., for covering the tiles, 70 roods, and cutting do., at 6d. per rood, gives per acre	1	15	0
	5	12	4
Ploughing with the Deanston plough, with four horses	1	6	0
Cost per acre	£6	18	4

SUBSOIL PLOUGH



Standidge & C° lith. London.

about to break up this field and to put it through a rotation, in the confident hope of increased production. I have also ordered a field of 20 acres, of dry and good land, cropped out by a bad tenant, to be treated with a view to this experiment on subsoils. The field lies in two ridges on the bank of the river Esk: the soil is alluvial deposit: on the lower ridge next to the river the surface is a fine loam of 12 inches deep, incumbent on a subsoil of sandy loam 16 inches deep. On the upper ridge the loam does not exceed 8 inches, but the subsoil is a good clay 13 inches deep: in the hands of tenants up to the present time, the depth of the furrow ploughed has never exceeded 6 inches. I have ordered the lower flat to be trench-ploughed to the depth of 14 inches, bringing the virgin loam to the top; I have ordered the upper flat to be stirred with Mr. Smith's subsoil-plough, thus breaking the lower crust, without changing the surface. The whole is to be manured equally with bone-dust, and a crop of turnips is to be taken.

I shall be happy, at a future time, to communicate the comparative result of this different treatment; and I trust I may be pardoned for my present intrusion, which arises from my anxiety to fix the attention of the farmer on this question of the treatment of subsoil, which by judicious management, I think, may add to the power of production without cost; especially when the surface by long and repeated cropping has been exhausted and has become comparatively sterile. At the commencement of our publication I could not omit an opportunity of endeavouring to use it for the legitimate purpose of inviting accurate experiment, with the view of circulating and extending agricultural knowledge.

I have the honour to be,

Sir,

Your faithful Servant,

J. R. G. GRAHAM.

Netherby, 26th January, 1839.

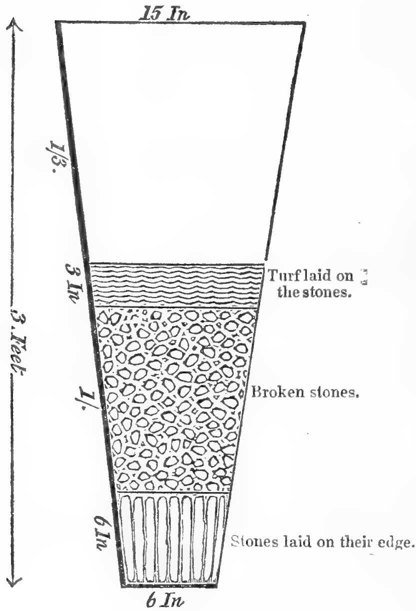
IV.—*Report of several Operations in Thorough-Draining and Subsoil-Ploughing, at Oakley Park.* From Mr. RICHARD WHITE. Communicated by the Hon. ROBERT H. CLIVE, M.P. Read Feb. 27th, 1839.

SIR,

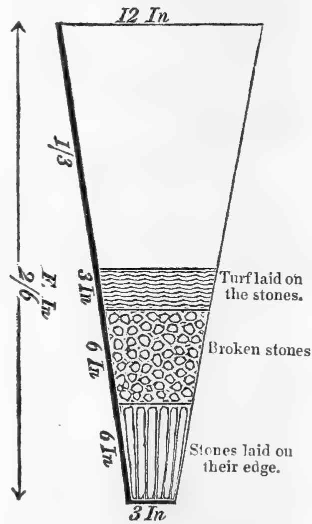
I beg leave to send you herewith a statement of the particulars of the extent of draining and subsoil-ploughing, together with the expenses attending the same, upon the farm in your own occupation. I consider it best to give it you in detail, that you may be

better able to judge of the progressive improvement that may take place under such a system: at the same time I beg leave to make a few observations as to the mode of draining and subsoiling, also to the state of the different fields previous to and since undergoing the process.

Main Drain.



Smaller Drains.



The main or leading drains are cut 3 feet deep, 15 inches wide at the top, taper to 6 inches at the bottom, and filled up with stone from 15 to 18 inches. The smaller drains, leading into the main, are 2 feet 6 inches deep, 12 inches wide at the top, taper to 3 inches at the bottom, and filled with stone 13 inches, with turf upon the stone. The stone is first placed on edge, about 6 or 7 inches, and the remaining part covered with stone broken to $2\frac{1}{2}$ inches: a section of these drains is given—the drains are parallel to each other. The subsoil varies much; the price for cutting the whole, breaking the stones, and filling, has invariably been 1*d.* per yard: some part has worked better than others, and, upon the whole, I think the work cannot be done for less. With regard to the distance between the drains, in this part, the work must be put out according to circumstances, which requires much attention, as great expense might unnecessarily be incurred, or

the object fail. When the land is ready for the operation of the subsoil-plough, a man with a pair of horses turns out the first furrow from 10 to 12 inches wide; then follows the subsoil-plough to the depth of 14 inches, taking care not to stir the turf covering the stones in the drains; it is worked at right angles of the drains, and drawn by six horses, two and two abreast. The plough is drawn from an axletree, with double shafts and low wheels; the horses draw perfectly even, and by this mode it is no more than ordinary work.

The statement of the expenses given may appear to vary, but that is in the carting of the stone; some part was carried three-quarters of a mile, and in other parts the stone was got in the same field.

As far as crops have been obtained since commencing this system, I can say but little. The turnips, from No. 2, sown late in July, 1837, were small, and nearly all destroyed by the hard frost: the barley-crop, last year, was said to be much better than any ever seen on the farm before—it is estimated at upwards of 30 bushels (imperial) per acre.

The fields Nos. 1 and 3 were worked for and sown with turnips last year (1838), and upon the stiffest soil; they were very good on the lighter parts: the wire-worm did much injury to the crops. Upon the other fields no crops have yet been got; but one very material point has been obtained in a very satisfactory manner—that is, the whole of the six fields were, previous to the draining and subsoil-ploughing, in a state of high narrow ridges, with surface gutters; but now forming a flat surface, without furrows or gutters, and perfectly firm.

The whole has been executed upon Mr. Smith's system, and, if that system is strictly followed and adhered to, I am firmly of opinion that the introduction will tend to greater improvement in the cultivation of the soil than anything hitherto brought forward.

In the course of a year or two, I have no doubt it will be in my power to lay before you the most favourable result; and, as you have personally attended to the operation of the draining and subsoiling whilst in the country, you will be much better able to judge of the improvement. The draining for 17 acres is now going on, preparatory to subsoiling, which will be carried into effect in due time.

I have the honour to remain, Sir,

Your faithful and very obedient humble servant,

RICHARD WHITE.

Oakley Park, Feb. 22, 1839.

To the Hon. Robert Henry Clive, M.P.

No. of Acres.	No. of Yards cut.	Description, &c.	Amount of Expenses.		
A. R. P.			£.	s.	d.
10 1 29	8436	No. 1.—The subsoil is a stiff clay, and the drains are 15 feet apart.—Cutting open, Laying the Drains, Breaking the Stone, and Filling-in, at 1*d.* per yard.	35	3	0
		Getting 422 loads of Stone at the Quarry, at 6*d.* per load	10	11	0
		Carrying the above to Drains, $\frac{3}{4}$ of a mile—7 horses, 20 days, at 21*s.* per day	21	0	0
		Filling, 422 loads of Stone, at $1\frac{1}{2}$*d.* per load . .	2	12	9
		Total	£ 69	6	9
		Expense per Acre .	6	18	6
		The above field was a two-years' ley, drained in Jan. 1837, ploughed and sown with oats, subsoiled after the oats; and turnips in 1838.			
11 2 5	7314	No. 2.—The subsoil varies much, part clay, loam, and part rocky; the drains are 21 feet apart. Cutting open, Breaking the Stone, Laying Drains, &c., at 1*d.* per yard	30	9	6
		Getting the Stone over different parts of the same Field, and wheeling to Drains, at $\frac{1}{2}$*d.* per yard .	15	2	0
		Three Horses, carrying remainder of Stone to Drains, three days, at 10*s.* 6*d.* per day	1	11	6
		Total	£ 47	3	0
		Expense per Acre .	4	2	0
		The above, a two-years' old ley, drained in June, 1837, subsoiled and sown with turnips and barley, 1838.			
7 0 14	3866	No. 3.—Varies much in the subsoil, one part stiff clay and part rocky and gravel; the drains are 18 and 36 feet apart; the stone got in the field.—For getting the Stone, Cutting and Laying the Drains, Breaking the Stone, &c., $1\frac{1}{2}$*d.* per yard .	24	5	9
		Carting 250 loads of Stone to Drains, 4 horses, 6 days, at 12*s.* per day	3	12	0
		Total	£ 27	17	9
		Expense per Acre .	4	0	0
		This piece was oats, after ley, 1837; drained in spring, 1838, subsoiled and turnips sown.			
14 1 30	7133	No. 4.—Varies much in subsoil: the drains are 20, 27, and 40 feet apart.—Getting Stone, Cutting and Laying Drains, Breaking and Filling-in, at $1\frac{1}{2}$*d.* per yard	44	11	0
		Carting 450 loads of Stone, 5 horses, 14 days, at 15*s.* per day	10	10	0
		Total	£ 55	1	0
		Expense per Acre .	4	0	0
		This piece was drained in Spring, 1838, ley sown with oats; subsoiled in November, preparatory for turnips in 1839.			

No. of Acres.	No. of Yards cut.	Description, &c.	Amount of Expenses.
A. R. P.			£. s. d.
5 0 0	3166	No. 5.—The subsoil a stiff clay: the drains 18 feet apart.—Getting the Stone, Cutting the Drains, Breaking the Stone, and Filling-in, at $1\frac{1}{2}d.$ per yard	19 14 11
		Carting Stones to Drains, 4 horses, 5 days, at 12*s.* per day	3 0 0
		Total	£22 14 11
		Expense per Acre .	4 11 0
		This piece fallowed out of ley, after draining and subsoiling in Summer, 1838: now sown with wheat.	
10 3 37	7459	No. 6.—Clay loam, but varies: the drains are 18 and 27 feet apart.—Getting Stone, Cutting and Laying Drains, Breaking Stone, and Filling-in, at $1\frac{1}{2}d.$ per yard	46 12 4
		Carting 466 loads of Stone, 19 days, with 7 horses, at 21*s.* per day	19 19 0
		Total	£66 11 4
		Expense per Acre .	6 0 0
		This piece was a ley, drained and subsoiled, fallowed and sown with wheat.	

ABSTRACT.

A. R. P.	YARDS.		£. s. d.
10 1 29	8436	Field, No. 1	69 6 9
11 2 5	7314	" No. 2	47 3 0
7 0 14	3866	" No. 3	27 17 9
14 1 30	7133	" No. 4	55 1 0
5 0 0	3166	" No. 5	22 14 11
10 3 37	7459	" No. 6	66 11 4
59 1 35	37,374	Total Expense	£288 14 9

Average Expense per Acre . . £4. 17*s.* 0*d.*

V.—*An Account of the Application of the Subsoil-Plough to a Dry Soil at Heckfield, Hants.* By Charles Shaw Lefevre, Esq., M.P. Read Feb. 13th, 1839.

Sir,

Although the effects of the subsoil-plough in the improvement of wet and tenacious soils are well known, I am not aware that any one has as yet applied this valuable implement to soils of a totally opposite character: I will therefore state to you, as briefly as possible, the result of an experiment which I have tried upon land in my own occupation, which has been attended with decided success.

I have a field of 6 acres, which for many years has been scarcely worth cultivating. It consists of a light sandy soil, from 5 to 7 inches in depth, covering a stratum of hard gravel. This stratum varies in depth from 8 to 12 inches; and below it there is a yellow sand, with a very slight admixture of loam.

There are no springs in the field; but, in wet seasons, on those spots where the surface of the field is uneven, the water is retained in pools until it has evaporated. In other parts of the field the same passes off immediately without being retained or absorbed by the subsoil; and, consequently, in dry seasons the crop is invariably parched and burnt up.

In the course of the session of 1836 I had an opportunity of hearing the interesting evidence of Mr. Smith, of Deanston, before the Agricultural Committee in the House of Commons, and it then occurred to me to apply the subsoil-plough, which had worked such wonders in a clay-soil, to a dry burning gravel.

The effect of my experiment will be best explained by a short statement of the produce of the field, for a series of years, up to the present period:—

Year.	Crop.	Produce per Acre.
In 1832	Oats	4 sacks.
1833	Turnips	Not quite 2 tons.
1834	Barley	Not quite 4 sacks.
1835	Clover	2 tons on the whole field.
1836	Wheat	3 sacks.

In the autumn of 1836 it was ploughed with the subsoil-plough, at a cost of 30*s.* per acre.

1837	Turnips	8 tons per acre.
1838	Barley	10 sacks per acre.

In other respects the land received the same treatment during the whole of this time. There is at present a fine plant of Dutch clover in the ground, which promises to prove an excellent crop.

I am, Sir, your obedient servant,

Charles Shaw Lefevre.

VI.—*An Account of an Experiment on the relative Values of several Varieties of Wheat.* By JOHN MORTON, Esq., of Chester Hill, near Stroud. Read Feb. 20th, 1839.

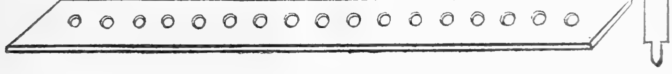
THE profits of farming, whether the land be pasture or arable, and the tenant be a feeder of stock or a tiller of the ground, may be increased in two ways.

The stock-farmer knows very well that the return he obtains from his cattle depends, not only on the kind of food given to them, and the manner in which it is supplied, but also on the feeding qualities of the breed to which they belong; and he increases his chance of profit as much when, on purchasing from the breeder, he selects with judgment, as when he adopts an improved mode of feeding.

The intelligent farmer of arable land, again, expects a greater crop, the more he has been able to improve the texture of the soil, and the better the nature and state of the manure which it contains. He expects it, because he knows that it depends on the nature of the food given to the plants, and the manner in which they are provided with a constant supply of it. The crop does not, however, depend only on this: for as two beasts fed in exactly the same manner may not be equally profitable, owing to a difference between them regarding the quantity and quality of the meat they afford, so two different kinds of wheat, though sown on land precisely similar, and in equally good condition, may give unequal returns, owing to a difference between them regarding the quantity and quality of the flour they afford.

Hence the importance, too often overlooked by farmers, not only of preparing the land for the crop in a good and sufficient manner, but also of selecting that kind of seed which experience has pointed out as being most valuable and productive.

It was with a view, not only of ascertaining the relative value, hardiness, and other properties of several of the most commonly-planted wheats, but also of effecting an improvement in the best of them, that the following experiment was commenced on the 1st of November, 1837. To insure accuracy in the results, it was necessary that the seeds of each variety should be planted so as to have them all at equal distances. To effect this, two boards were used, each 6 inches wide, 9 feet long, and half an inch thick. Along the centre of each board was a row of holes, 3 inches apart and 1 inch in diameter. A dibble was made to fit into the holes, having a shoulder at the distance of 2½ inches from the point. The board and dibble are represented in the annexed figure.



When the board was placed on the ground, and the dibble put through each hole in succession, a series of holes was thus made, 2 inches deep, and three inches apart from centre to centre.

After this had been done through the first board, the second, which was touching it, and parallel to it, was served in the same way; and then the first was taken up, and placed on the other side of the second. By proceeding thus, the whole ground was finished, and then one grain of wheat was dropped into each hole. The rows were thus exactly 6 inches apart, and the grains in the rows were 3 inches from one another. The regularity with which the planting was performed was thus mathematically accurate. The ground planted lies on the lower edge of the great oolite formation, and the soil is a stone brash, about 10 inches in thickness. Crops of potatoes had been taken off it for a succession of eight years; and it had been manured every alternate year, with a compost of equal bulks of stable-dung and earth, at the rate of about 20 cubic yards per acre. It was 67 feet in length; and 3 rows of each variety of wheat were planted, except the first and last numbers, of which there were 4 rows. The outer row of each of these, however, was not taken into account, because their roots had a much greater extent of ground for their growth than the others, whose roots touched one another all round. The end plants of each row were also rejected for the same reason. 66 feet in length of ground were thus taken up, and 3 rows of each variety occupied in width 1½ foot: the ground occupied by each variety was thus 99 square feet, the 440th part of an acre.

(In the opposite page is a tabular account of this experiment.)

Although the tabular form in which this experiment is detailed explains itself by the headings of each column, yet it is considered necessary to give a somewhat fuller account of it. The seed from which the first 10 varieties were raised was carefully selected from specimens of each obtained in the ear. The others were from samples, and here, also, the greatest care was taken that the seed from which each was raised should be the best and plumpest that could be obtained.

The first five columns need no explanation beyond what is given at the head of each: the sixth shows the number of grains lost from casualties. If the frost had been the only agent in the destruction of so many of the seeds, this column might have been considered as a very accurate index of the relative hardiness of each variety. This, however, is not the case, for the havoc which the birds made must also be taken into account. It was thought at the time that more injury was sustained, from the latter cause, by those varieties planted on the 21st, than by any of the others; but this does not appear to have been the case, for, if the great loss sustained by these had been wholly owing to the havoc committed by the birds,

When planted.	No.	Name of Wheat.	Whence obtained.	No. of seeds planted.	Loss of seeds from birds, frost, &c.	Produce of 99 square ft. Plants or roots.	Produce of 99 square ft. Heads of grain.	No. of ears in one square foot.	Average No. of heads per root.	Weight of grain produced from 99 square feet. lbs.	Weight of wheat per acre. Tons. cwt. qrs. lbs.	No. of bushels per acre, at 64 lbs. per bushel.	Length of straw. ft. in.	Weight of straw produced from 99 square feet. lbs.	Weight of straw per acre. Tons. cwt. qrs. lbs.	Weight of roots with 2 in. of stem. lbs.	Weight of roots per acre. Tons. cwt. qrs. lbs.
Nov. 15	1	Old red Lammas .	Pusey, Berks . .	792	387	405	2463	25	6	6	1 3 2 8	$41\frac{3}{4}$	5 8	$16\frac{1}{2}$	3 5 2 24	5	0 19 2 6
..	2	Golden drop . .	.. ..	792	291	501	2542	25	5	$6\frac{3}{4}$	1 6 2 8	$46\frac{3}{4}$	5 6	$15\frac{1}{4}$	3 0 0 3	$5\frac{1}{4}$	1 0 2 14
..	3	Ten rowed prolific	Hareby, Lincolnsh.	792	391	401	1935	19	$3\frac{2}{5}$	$4\frac{1}{2}$	0 16 2 16	27	5 5	$12\frac{3}{4}$	2 10 0 10	5	0 19 2 6
..	4	Hunter's . . .	Leek, Lincolnshire	792	273	519	2028	20	$4\frac{1}{5}$	$4\frac{1}{2}$	0 16 2 16	27	5 6	$12\frac{3}{4}$	2 12 0 10	5	0 19 2 6
..	5	Thick-set Suffolk .	Lyford, Berks .	792	120	672	3039	30	$4\frac{1}{2}$	$10\frac{1}{2}$	2 1 1 0	$72\frac{1}{4}$	5 8	$19\frac{1}{2}$	3 5 2 14	$7\frac{1}{2}$	1 9 1 24
..	6	Hickley's Prolific .	Old Buckingham, Norfolk	792	132	657	2886	29	$4\frac{1}{3}$	$10\frac{1}{6}$	1 19 3 3	$69\frac{1}{2}$	5 7	$16\frac{1}{2}$	3 5 2 24	$6\frac{3}{4}$	1 6 2 8
16	7	White Taunton .	Wallingford, Berks	792	305	487	2695	27	$5\frac{1}{4}$	6	1 3 1 20	$41\frac{1}{2}$	5 6	$15\frac{1}{4}$	3 0 0 0	$5\frac{1}{2}$	1 1 2 12
..	8	Silver drop . .	Lyford, Berks .	792	218	574	2582	26	$4\frac{1}{2}$	8	1 11 1 20	55	5 6	$18\frac{1}{2}$	3 12 2 12	6	1 3 2 8
..	9	Scotch white . .	.. ..	792	379	413	2386	24	$5\frac{3}{4}$	$6\frac{1}{4}$	1 4 2 6	43	5 9	$16\frac{1}{2}$	3 5 2 24	$5\frac{1}{2}$	1 1 2 12
..	10	Talavera . . .	Taunton . . .	792	434	358	1985	20	$5\frac{1}{2}$	$5\frac{1}{4}$	1 0 2 14	36	5 8	$14\frac{1}{2}$	2 16 3 14	$5\frac{1}{2}$	1 1 2 12
21	11	Smithers' Hereford white	Cirencester (Smith)	792	319	473	2529	25	$5\frac{1}{3}$	$9\frac{1}{2}$	1 17 1 8	$65\frac{1}{2}$	5 6	$17\frac{1}{2}$	3 8 3 20	5	0 19 2 0
..	12	A red wheat . .	.. ..	792	252	540	3453	35	$6\frac{2}{5}$	12	2 5 1 12	$82\frac{1}{2}$	5 0	22	4 7 0 2	9	1 15 2 6
..	13	Egyptian Cone .	.. ..	792	528	264	711	7	$2\frac{1}{3}$	$3\frac{3}{8}$	0 13 0 24	23	6 0	$8\frac{1}{4}$	1 11 2 2	3	0 11 3 4
..	14	Red straw Lammas	.. ..	792	510	282	2096	21	$7\frac{3}{5}$	$4\frac{1}{2}$	0 16 2 16	27	5 8	$14\frac{1}{2}$	2 16 3 4	5	0 19 2 6
..	15	Blue cone . . .	.. ..	792	264	528	1626	16	5	6	1 3 1 28	$41\frac{1}{2}$	6 0	$9\frac{3}{4}$	1 16 1 16	6	1 3 2 8
..	16	Red cone . . .	.. ..	792	456	336	2446	24	7	10	1 19 1 4	$68\frac{3}{4}$	5 3	$12\frac{1}{2}$	2 9 0 0	$4\frac{3}{4}$	0 18 2 10
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Note.—Specimens, in the straw, of each of the varieties mentioned in the Table were laid before the Society.

it is evident that the varieties marked Nos. 12 and 15 would not have been so slightly injured, while Nos. 11, 13, 14, and 16, suffered so severely. The figures in this column may, therefore, be said to indicate with tolerable accuracy the relative ability of each variety to withstand the effects of a severe and changeable winter, such as that during which the experiment was made.

The number of plants of each variety which came to perfection, is placed opposite the name of each in the seventh column. This was ascertained by pulling each as they respectively ripened, and counting the plants of each before proceeding to the others. In this way, by a simple subtraction, the numbers contained in the sixth column, also, were ascertained.

When all the plants of any variety had been pulled, the number of ears, also, belonging to them was counted, and the results are placed in the eighth column.

By dividing these by 99, the number of square feet which each variety occupied, we obtain the number of ears in each square foot; and this is placed opposite the name of each wheat, in the ninth column.

The average number of ears to each root, ascertained by dividing the number of ears by that of the roots, is placed in the tenth column. This column shows the degree in which each species possesses the important property of spreading and shooting out stems, or, as it is technically termed, of *tillering;* and it will be seen that they vary in this respect greatly.

After having been pulled and dried, the wheat was carefully rubbed out; and after the light and imperfect grains had been separated, the weight of the remainder was taken, and placed opposite each sort, in the eleventh column.

The thirteenth column contains the number of bushels per acre raised from each variety. As the quantity produced was so small, there was some difficulty in obtaining the particulars which this column contains.

The mode adopted was this. The average weight of several of the varieties was ascertained by weighing 8 pints of each, to be at the rate of 64 lbs. per bushel, some being rather more, and others less. The number of bushels were then obtained from the weight of wheat per acre, by dividing it by 64.

The weight of straw, which is placed in the fifteenth and sixteenth columns, was ascertained after the roots had been cut off, and after it had remained out sufficiently long to dry it perfectly.

After the earth had been removed from the roots, which had been cut off with about 2 inches of the stem, they were weighed, and the result placed in the seventeenth and eighteenth columns. The object of this was to ascertain the amount of vegetable matter left in the soil after the wheat crop has been removed, and the

result greatly exceeds any conception of it that had been previously entertained.

The inferences which, it is presumed, may be drawn from the above details, are the following :—

1st. With regard to the hardiness of the varieties, which, as we have already said, may, to a certain extent, be deduced from the particulars contained in the sixth column, that they may be placed in three classes. Nos. 5, 6, 8, 12, 15, 4, and 2, being the hardiest; Nos. 13, 14, 16, and 10, being the most delicate; and Nos. 1, 3, 7, 9, and 11, occupying an average station.

2nd. With regard to the property of *tillering*, of which we have already spoken, that Nos. 12, 14, 16, and 1, possess it in the greatest degree; that Nos. 3, 13, 4, 5, 6, 15, 8, and 2, possess it in the least; and that Nos. 7, 9, 10, and 11, hold a medium rank.

3rd. That with respect to the relative value of each variety mentioned in the table, No. 12 is undoubtedly the best of any, in productiveness, and in being sufficiently hardy; that No. 13 is as undoubtedly the worst of any, as will be seen by a reference to any of the columns; and that the others vary greatly, some possessing nearly three times the productiveness of others.

These 16 different sorts of wheat, with the exception of Nos. 13, 15, 16, which are bearded, are merely varieties of one species of the genus Triticum; and the circumstance of differences existing among them, some possessing three times the value of others, shows that any variety is capable of improvement. This, indeed, is shown by many other plants besides the wheat. The originals of the potato, the carrot, and the turnip, were comparatively insignificant and useless in their application as food, and it was only by careful and repeated cultivation that they were at length brought to their present condition, and made to hold such an important rank among the many nutritive plants cultivated for the food of man and beast. It is supposed then, and where it has been tried experience shows it to be a fact, that, by first ascertaining the best of many varieties of wheat, and planting the finest and plumpest seeds selected from the best sample that could be obtained of it, the last of a succession of crops, the first of which was raised in this manner, and all the others from seeds selected out of the produce of the preceding harvests, would, at length, afford a wheat of a more productive and valuable kind than has hitherto been used by the farmer. The experiment here detailed is, then, merely the *first step* in the process—it merely points out the best of the varieties which were tried. The improvement of these by repeated cultivation still remains to be effected.

During the growth of the wheat, a journal was kept, an extract from which is given here, as it refers to an insect which was ob-

served after the blossoming of the plants, and to which the destruction of many of the seeds was owing.

Observations of this kind might be easily and generally made, and they would be useful as information regarding the nature and habits of the insects which attack wheat; and answers to the how? when? and where? on the subject, which would thus be obtained, afford the only guide to the invention of means for their destruction.

1838. EXTRACT FROM JOURNAL.

July 5th.—All the wheat is in blossom, except Nos. 13 and 15.

14th.—Very rainy and windy weather. Whether will this be found to injure or improve the quality of the grain?

16th.—Since the rain of the 14th, an orange-coloured substance, like rust, has been observed in the seed-vessels of some of the ears, as if the rain had got in and rotted the pollen. A very small fly has been observed about the ears in the evening. Many of the ears are filling rapidly, some are already full, and others are only in blossom.

19th.—In the ears of wheat, which were before-mentioned as having abortive grains, owing, as was thought, to the pollen having been rotted by the rain, I now find small orange-coloured grubs, about the tenth of an inch long, doubtless the offspring of the small fly observed about a week ago.

Aug. 4th.—All these grubs have disappeared.

27th.—Nos. 4, 10, and 11, are ripe and pulled.

28th.—Nos. 3, 5, and 6, are ripe and pulled.

29th.—Nos. 7, 8, and 9, are ripe and pulled.

30th.—Nos. 2, 12, and 16, are ripe and pulled.

Sept. 1st.—Nos. 1 and 14 are ripe and pulled.

2nd.—Nos. 13 and 15 are ripe and pulled.

The account of this experiment is thus finished, and there now remains but to state what will have already occurred to the reader, especially if he be apractical man, that it is not one nor many experiments, if conducted on a small scale, which will accurately determine the point this tends to ascertain.

The farmer himself must first be convinced of its importance, and the observations and experiments on this subject, which, if he be actuated by no higher motive, self-interest will then urge him to prosecute with diligence, will ultimately, no doubt, be crowned with success.

JOHN MORTON.

To the Secretary of the English Agricultural Society.

VII.—*On the Employment of Gas-Water as a Manure.* In a Letter to the Secretary, by John Paynter, Esq. Read Feb. 1839.

Sir,

Observing that you invite communications on experiments in agriculture, I take the liberty of sending you the result of one with gas-water—the water in which the street-gas has been cleansed. Having often thought that the alkali therein contained must be favourable to vegetation, I was induced, a few years ago, to try it on a piece of barley-land. A quarter of an acre was taken in the middle of a field, of rather close soil, in a granite district. The land was of average quality. The gas-water was distributed over the quarter-acre by a contrivance resembling that of a common watering-cart, and at the rate of 400 gallons to the acre, about a week before seed-time. The rest of the field was manured in the usual way.

The difference, both in colour and vigour, of the barley-plant was so strikingly in favour of the part manured by gas-water, that persons passing within view of the field almost invariably came to inquire about the cause. The yield also was superior, as well as the after-pasture, the field having been laid down with the barley.

The experiment was tried on the farm of Boslivin, about seven miles from Penzance. My distance from a gas-work has prevented me from following up the subject since: but I feel convinced that this water, so often complained of as a common nuisance, might be most profitably employed both in agriculture and horticulture. It might be poured on muck-heaps, where it would probably destroy grubs, &c., in addition to its fertilizing properties.

I am, Sir, your most obedient servant,

John Paynter.

Boskenna, Jan. 9th, 1839.

Note by H. Handley, Esq., M.P.

In confirmation of the foregoing letter, it may be observed that in many parts of the country, where gas-works are established, the refuse has recently become an object of interest to the agriculturist, as containing many of the essentials of the most effective manures. The refuse lime, which was formerly an inconvenience to the gas manufacturers, and was carted away as valueless rubbish, is now contracted for by neighbouring farmers (in an instance, within my own knowledge, at 7*s.* 6*d.* per chaldron), and applied either in compost or in a direct form to the land; where, in addition to the

usual operation of lime, it is said to furnish a protection against many of the noxious grubs and insects.

It is further probable that the ammoniacal liquor which abounds in gas-works, and which, when formerly allowed to run waste into the Thames, was said to destroy the fish, and prejudice the quality of the river-water for human consumption, and which is still thrown away throughout the country, except at a few works where they manufacture volatile ammonia, will, ere long, be extensively used as a manure, either through the intervention of the water-cart, or by the process of saturating and decomposing soil or vegetable matter. A very satisfactory illustration, on a small scale, has recently been submitted to the English Agricultural Society by the intelligent curator of the Polytechnic Gallery, Mr. Pain. He put into a vessel some leaves of trees, saw-dust, chopped straw, and bran, to which he applied ammonia, and closed it up. In about three weeks the whole was reduced to a slimy mass: he then stirred it and added a little more ammonia; and when submitted to the Society it was reduced to a black mass of vegetable mould, strongly impregnated with volatile salts, and in comminuted particles similar to surface peat-mould.

I have reason to believe that, in an experiment on tanners' bark, now in progress in my neighbourhood, the results will be satisfactory. When applied in its liquid form to grass-land, like salt, it apparently destroys the plant, but the spot is distinguished by increased verdure the succeeding year.

VIII.—*An Essay on the simplest and easiest Mode of Analysing Soils: to which the Prize of twenty pounds was awarded in December*, 1838. By the Rev. W. L. Rham, A.M., Vicar of Winkfield, Berks.

It is presumed that the object of the English Agricultural Society, in offering a prize for the best account of the cheapest and simplest mode of analysing soils, is to encourage farmers unacquainted with chemistry to make experiments on soils of known fertility, comparing them with others, in order to discover the circumstances which chiefly influence fertility, and the means by which less fertile soils may be improved.

The writer of the following Essay has no expectation that the little light which his experience enables him to throw on this subject should be thought worthy of a prize, even if no better mode of analysing soils should be offered by men fully acquainted with all the mysteries of chemistry. But as it may furnish hints to those who are interested in the progress of scientific agriculture, he ventures to describe a very simple mode of analysing soils, which he has found useful in practice, if not so absolutely perfect as those which are recommended by chemical writers.

Every practical agriculturist will allow that, besides climate, exposure, and other local circumstances, the fertility of a field depends more on the texture and division of the component parts of the soil, and its consequent affinity to water, than on the absolute

proportions of the simple earths of which it is composed. Thus, a sandy or siliceous soil, of which the particles are extremely minute, readily diffused through water, and slowly deposited, approaches to the nature of a clay-loam, being retentive of water, and binding in drying. The hard particles of argillaceous or calcareous stones, on the other hand, according to their size, have qualities very analogous to siliceous gravel or sand, the chemical properties of the earths not coming into action, except by means of other chemical agents. But the organic portion of the soil, which arises from the decomposition of animal and vegetable substances, has the greatest influence on the fertility, by modifying the effects of sand or clay, and furnishing the real nutriment of plants by its action with light, heat, air, and moisture. It appears from this that the chief object, in a practical agricultural analysis of a soil, is to ascertain the relative size of the particles of which it is composed, their chemical nature, their affinity to moisture, and the quantity of organic matter intimately blended with the earths. Any adventitious substances which may influence the fertility ought to be detected, if possible; but, unless these are in a sufficient quantity to produce a decided effect, they may in general be neglected.

It must be kept in mind that it is not a chemical nor a mineralogical analysis which is attempted to be described: it is a mere examination of the soil, which may be sufficient for the purposes of the farmer, and which the man of science may carry on to any extent and accuracy: we will only carry it so far as can be followed by any man of common information, however deficient in chemical knowledge.

We proceed to the description of the process we recommend. The soil to be examined must be taken a few inches under the surface, and in different parts of a field. If there appears much uniformity, the portions may be mixed, in order to have the average quality of the soil: should there be a visible difference between one portion and another, which is often the case, each may be analysed separately.

A portion of the earth to be analysed is dried in the sun or near a fire, until it feels quite dry in the hand. It is then reduced to powder by the fingers, or by rolling it on a deal board with a wooden roller, so as to separate the particles, but not to grind them: any small stones above the size of a pea must be taken out. If these form a considerable part of the soil, their proportion must be ascertained by weight; their nature and quality may be afterwards examined. This being a very simple operation, and obvious to the sight, need not be described. Where the stones and pebbles are evidently accidental, they may be overlooked, as having little influence on the fertility. The dry earth, cleared

from stones, should be accurately weighed; and it is convenient to take some determined quantity of grains, as 1000, 500, or 250, according to the accuracy of the instruments at hand. This portion should be put into a shallow earthen or metal vessel, and heated over the fire, or a lamp for about ten minutes, stirring it with a chip of dry wood: the heat should not be so great as to discolour the wood. It may then be allowed to cool, and be weighed again; the loss of weight indicates the water which remained uncombined after the soil appeared quite dry. This is the first thing to be noted.

The power of retaining water, without any external appearance of moisture, is greatest in humus, next in clay, both of which readily absorb it from the atmosphere; carbonate of lime does so in a less degree, and siliceous sand least of all. This moisture occupies the pores of the soil, and is very different from the water which is combined with clay as a part of its substance, and to which it owes its ductility: for when this last is expelled by a great heat the clay loses its quality, and approaches to the nature of sand. Pounded brick will not bind with water; and porcelain reduced to a fine powder has all the properties of siliceous sand in the soil. The finer the division of the particles of the soil, the greater will be its power of absorbing and retaining water; but in a soil where clay greatly predominates the lumps sometimes become so hard and baked by the sun that the moisture cannot penetrate, and in this case the power of absorption is much diminished. Hence loams in which there is a good proportion of humus have a greater power of absorption than the pure earths. Taking all circumstances into consideration, it will be found that the soils which most readily absorb moisture are also the most fertile, and therefore it is important to ascertain their power of absorption.

This can be found by comparison. Equal portions of different soils, dried as before, are placed in the opposite scales of a good balance, and left exposed for some time to a moist atmosphere. That which preponderates has the greatest power of absorption; the degree is measured by the difference of the acquired weights.

Another important circumstance is the specific gravity of a soil. The different earths have very different specific gravities; and humus being lighter than any mineral earth, the lightness of the soil is a sure indication of its richness, excepting where this lightness is occasioned by an excess of undecomposed vegetable matter, or peat. Humus, when nearly pure, has a specific gravity varying from 1.2 to 1.5; fine porcelain clay, 2; chalk, about 2.3; siliceous sand from 2.5 to 2.7: mixed soils have specific gravities varying according to the proportions of their component parts. Those in which clay, chalk, and humus

abound, and which are generally the most fertile, are the lightest. The sandy soils are heavier, and the more so if they contain oxydes of iron or of other metals; and it is well known that the ferruginous sands are the most barren. The common expression of *light*, when applied to a sandy soil, has no reference to its specific gravity, but merely to the force required to plough it. No carrier would say that a loose sandy road was a light one.

The easiest and readiest method of determining the specific gravity of earth, or any substance which is of a loose texture, is that described by Dr. Ure in his Philosophy of Manufactures, (page 97), as employed by him to ascertain the specific gravities of cotton, wool, silk, and flax. It is as follows:—Take a narrow-necked phial capable of holding four or five ounces of water; mark a line round the middle of the neck with the point of a diamond or a file; fill the phial up to the mark with river or rain water, and poize it with sand or any other substance in a scale; then put 1000 grains weight in the same scale with the phial, and pour out water till the equilibrium is restored. In the vacant space, which is evidently equal to the bulk of 1000 grains of water, introduce the soil till the water rises to the mark in the neck. Then put into the opposite scale grain weights sufficient to restore the equilibrium. The number of grains required for this purpose will denote the specific gravity of the soil compared to water as 1000. Suppose, for example, that siliceous sand, which is 2.7 times denser than water, is poured into the vacant space, it will require 2.700 grains to fill the space occupied by the 1000 grains of water; and thus we have the specific gravity without any calculation. If instead of 1000 grains, we use only 500, or 250, the result will be the same, if we multiply the grains in the other scale by 2 or 4.

We will give a few examples of soils of which the specific gravity has been carefully determined.

A rich garden soil, which contained per cent.,

Clay	52.4
Siliceous Sand	36.5
Calcareous Sand	1.8
Carbonate of Lime	2.0
Humus	7.3

had a specific gravity of 2.332.

A good loam consisting of

Clay	51.2
Siliceous Sand	42.7
Calcareous Sand	0.4
Carbonate of Lime	2.3
Humus	3.4

had a specific gravity of 2.401.

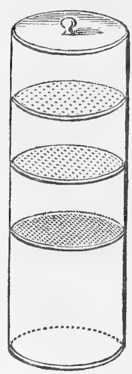
A pooer soil, of which the component parts were

Silicious Sand	64.0
Clay	32.3
Calcareous Sand	1.2
Carbonate of Lime . .	1.2
Humus	1.3

had a specific gravity of 2.526.

These examples suffice to show that the specific gravity of a soil is some tolerable indication of its fertility. It cannot, however, be entirely relied upon in the absence of other proofs; for there may be many different mixtures of earths which will have the same specific gravity, although they may differ greatly in their fertility; but it will facilitate the analysis, and often detect mistakes in the process, if the result does not accord with the specific gravity found.

We proceed now to the analysis. The portion of soil which has been deprived of all its water, as described above, must be sifted through metallic sieves of different fineness; the first is made of a perforated tin plate, the holes of which are about one-twentieth of an inch in diameter. Whatever does not go through this is put by. The remainder is successively passed through two or three more sieves, increasing in fineness to the last, which is of the finest wire-cloth, having from 150 to 170 threads in an inch: whatever passes through this is an impalpable powder. Thus we have already a division of the soil according to the size of its particles:—1st, the coarse grit left in the first sieve; 2nd, the finer grit in No. 2; 3rd, fine sand in No. 3; and 4th, impalpable powder, which has passed through the last sieve. To facilitate this part of the operation the sieves may be made so as to fit into one another, like the filterers in a coffee-biggin, the last fitting into a tin pot which will hold about a pint of water; a cover being made to fit on the top sieve, the instrument is complete. (See Fig.) Thus all the sifting may be done at once, without any loss. Any lumps which are not thoroughly pulverized must be broken. The coarser sand



left in the sieve No. 1 must now be washed with pure water to detach any fine dust adhering to it; what runs through may be used to wash No. 2, in the same manner, and then may pass through No. 3 to the impalpable matter which passed through all the sieves. A sufficient quantity of water must be used to render the whole of this last nearly fluid. There will then be three different portions of the washed soil left in the sieves, and a portion of impalpable matter diffused through the water in the lower division

of the instrument. This last is the principal object of analysis, and that to which Sir Humphrey Davy usually confined his attention, merely noticing the proportion of coarser sand in the soil. It contains, no doubt, the great principle of fertility and nutrition; and the effect of the coarser parts may be considered as chiefly mechanical. But they may much affect the fertility of the finer parts, and are of the greatest importance to the soil in which they are blended: they consequently deserve a more minute examination, to which we will return. In the mean time our attention shall be directed to the composition of the finer earth in No. 4, which is mixed with water in a semi-fluid state. This is well shaken, and suddenly poured into a deep glass vessel, and allowed to settle for a few minutes, when the heavier earth, which is sand, will be deposited, and the lighter may be poured off suspended in the water. It requires some little practice to effect this at once, but a few trials will soon enable any one to do it. This operation may be repeated until all the sand, of which the particles are visible to the naked eye, is separated. The earth and water decanted out of this last vessel are now poured into a glass tube, 18 inches long (No. 1), the bore of which is less than an inch: one end is stopped with a cork fitted into it, and the other has a small lip for the convenience of pouring out the contents. In a short time there will be a further deposition of earth, which will be principally alumina. What remains suspended in the water over it is gently poured off into another similar tube (No. 2): this will contain nearly the whole of the humus, which will take some hours to be deposited in the form of a fine brown mud. The contents of the tube No. 1 may now have a little more water added to them; after being well shaken, the tube may be set upright, and left for half an hour to settle: what remains suspended in the water after this must be added to the humus in the tube No. 2. After some time this will also be deposited; and the clear water may be decanted off. The mud which remains is put on filtering-paper in a glass funnel, and, when all the water has drained from it, it is dried over the fire, and weighed. This is the most important portion of the soil.* The fine earths deposited in the

* The dark mud which is last deposited, and which we call humus, for want of a better name, contains no doubt a considerable portion of extremely fine earth, which may be detected by heating it red-hot in a crucible, until all the carbonaceous matter is burnt and converted into carbonic acid gas. This may be accelerated by throwing into the crucible small portions of nitrate of ammonia. The oxygen of the nitric acid will unite with the carbon, and the nitrogen and ammonia fly off in the form of gas, leaving no residuum but the mineral earths and salts. But the organic matter being destroyed by this operation, its quantity alone can be discovered. The vegetable matter, which gives the soil its fertility, all other circum-

tube No. 1 will consist of very fine particles of sand, clay, and perhaps carbonate of lime. The sand will appear deposited in the bottom of the tube. The clay may be easily diffused in the water above it by stirring it carefully with a small rod without reaching the sand. It may then be decanted off with the water into another tube (No. 3), and allowed to settle: this part of the operation may be carried to a great degree of perfection by great care, and by examining the results occasionally with a small microscope; but for all common practical purposes it is sufficient to separate the vegetable earth from the mineral, and the visible particles of sand from the finer.

The contents of No. 1, having been collected, as well as those of No. 3, are dried over the fire and accurately weighed. The same is done with the earths which remain on the sieves.

All the water in which the earths have been diffused and washed is collected and passed through filtering-paper, and then set over the fire in a common saucepan. It is boiled away gently until it is reduced to a small portion, which begins to look turbid. The complete evaporation is finished in an evaporating-dish, as slowly as possible, and the residue is the soluble matter contained in the soil. It will be sufficient to dry and weigh this, as its further analysis would require more skill and chemical knowledge than we suppose in the operator. Salts may be detected by the taste, or by the crystals formed in the evaporation; but, unless there is a decided saline taste, the whole may be considered as soluble humus, and the immediate fertility of the soil depends greatly on the quantity of it.

To recapitulate what has been obtained,—we shall have the coarse grit in sieve No. 1; the sand in Nos. 2 and 3; the fine earth separated in the tubes Nos. 1 and 3; the humus in tube No. 2 and on the filtering-paper; and the soluble parts in the evaporating-dish. All these substances must be well dried over the fire, as was done with the soil at first, and each separate part

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stances apart, and which appears in various forms, according to the degree of decomposition, it has undergone and the circumstances under which it has taken place, may be obtained by dissolving it in a caustic alkali, and precipitating it by means of an acid. The precipitate has been named *humic-acid*, or *ulmic-acid*, and has often been confounded with humus, or vegetable mould. It is no doubt a component part of humus; but it is not found pure and uncombined in the earth, as far as we know. The real humus is a very compound substance, and exists in so many forms, that the experiments, which have hitherto been made, have not much increased our knowledge of it. It would be worthy the labour of some of our greatest chemists to trace the progress of vegetable decomposition, under various circumstances, and to detect the regular change which takes place in the arrangement of the elementary component parts—carbon, oxygen, hydrogen, and occasionally nitrogen—as the living vegetable dies, and is gradually transformed into humus, when deposited in the earth.

accurately weighed. The sum of them ought to be equal to the original portion of soil subjected to analysis after the water was driven off; but there always is a loss, even with the most experienced analyser. This loss will be principally in the finer parts, which are dissipated in the operation.

But the analysis is not yet completed: we have separated the sand, clay, and humus; but there may be a portion of carbonate of lime, in the form of sand, or of finely-divided earth mixed with the other earths. To ascertain this, each portion, excepting the humus, is put into a separate cup, and a little muriatic acid, diluted with four times its weight of water, is poured on it. If there is any effervescence, it shows the presence of carbonate of lime; diluted acid is then added gradually, as long as the effervescence is renewed by the addition. When this ceases, and the water continues to have an acid taste, more pure water is added, and each portion separately filtered, dried, and weighed. The loss of weight in each gives the quantities of carbonate of lime dissolved by the muriatic acid, and which has passed with the water in the form of muriate of lime.* The different weights being now collected, the result of the operations may be set down.

There may be many mineral substances in the soil, which this mode of analysing will not detect; and some of these may materially affect the fertility. In most cases there will be something to indicate the presence of metals. Iron abounds in most soils: when the quantity is considerable it will be detected by pouring a decoction of gall-nuts into the water which has washed the earth; it will immediately become of a bluish dark colour. The other metals are not of frequent occurrence. Sulphate of lime or gypsum, and also magnesia, are found in some soils; but the separation of them can only be effected by those who are well-acquainted with chemistry: they fortunately occur very seldom, and the places where they are found are generally well known. For all practical purposes it is sufficient to ascertain the proportion of sand, clay, carbonate of lime, and humus which any soil contains.

Many soils which have been highly manured contain portions of undecomposed vegetable substances, and fibres of roots;

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* It may be objected to this mode of ascertaining the carbonate of lime, that the muriatic acid will dissolve iron, and a portion, however small, of alumina, as well as carbonate of lime, and that the collecting the carbonic acid evolved is a more exact measure of the quantities of the carbonate. This may be admitted, but we repeat that we only propose a simple and easy analysis, which will approximate to the truth, and not by any means a perfect one. We hope some more perfect, and no less simple, analysis will be invented by those who are masters of the science of chemistry.

these will be found mixed with the coarser earths separated by the sifting: not being a part of the natural soil, they need not be taken into the account; but they may be separated by washing the earths, as they are much lighter, and will come over in the first decantations. They may be dried and weighed, and the quantity set down in the result, if it is desirable.

Some very barren sands, containing very little argillaceous earth or humus, may readily be known by the copious sandy deposit which they rapidly make when diffused through water. Good natural loams are not so easily judged of; but the preceding mode of analysis will in general detect their intrinsic value. When a soil contains peaty matter, it is easily discovered by the irregular black particles which are visible in it. Peat differs from humus only in being in a different state of decomposition, and containing a considerable portion of tannin; when acted upon by lime or alkalies, and brought into a state of greater decomposition, it is not to be distinguished from humus in its qualities.

The only instruments absolutely required for the foregoing analysis are, in the first place, two good balances, one capable of weighing a pound and turning with a grain, and one weighing two ounces and turning with the tenth part of a grain.* Next, the combination of sieves, which we have described, and which may easily be made by any tin-smith. But any sieves of the required fineness, whether of metal, horse-hair, or silk, provided they be of the proper texture, will answer the purpose for a trial. Some earthen or glass jugs, and two or three glass tubes, 18 inches long, open at both ends, which may be obtained at any glass-blower's, or chemist's, a glass-funnel, and some filtering paper will complete the apparatus. The only chemical substance indispensable to the analysis, is some muriatic acid, commonly called spirit of salt. A little test-paper to detect acids in the water with which the soil has been washed, and an infusion of gall-nuts to ascertain the presence of iron, may be useful. A small glass-phial will serve for the specific gravities. The whole of these instruments and materials may be procured for a very small sum. If the foregoing process is carefully followed, any person, however unaccustomed to chemical operations, will soon be enabled to satisfy himself as to the composition of any soil of which he desires to know the comparative value. He must not be disheartened by a few failures at first. However simple every operation may appear, it requires a little practice and much pa-

* If there is a doubt of the accuracy of a balance, the best mode of weighing is to poise the substance to be weighed with fine sand, and then substitute weights for it, till the sand is poised again. If a certain portion is to be weighed, poise the given weight with sand; then remove the weight, and poise the sand with the substance to be weighed.

tience, if we would come to a very accurate result. Every portion must be dried to the same degree before it is weighed;—minute portions which adhere to the vessels, when dried, must be carefully collected by scraping, and brushing off with a feather;—pieces of filtering-paper and of linen must be weighed before they are used, that small portions of matter adhering to them may be ascertained by the increase of weight. By attending to these particulars it is surprising how nearly the whole original weight is accounted for in the summing up of the separate parts.

If this mechanical analysis should be thought lightly of by experienced chemists, let them only carefully analyse a portion of soil by this process, and then another by any more perfect mode, and compare the importance of the results, as regards practical agriculture. The object is to ascertain the productive powers of the soils; and, for this purpose, the separation of the different earths is sufficient, in the present imperfect state of our knowledge of the mysteries of vegetation.

The process which we have described, simple as it is, may yet be too tedious for the farmer who is desirous of speedily comparing different soils; and we will indicate a still simpler method of ascertaining, nearly, the composition of a soil, and a simple instrument by which it may be done. Take a glass tube, $\frac{3}{4}$ of an inch in internal diameter, and 3 feet long; fit a cork into one end, and set it upright; fill it half-full of pure water; take nearly as much water as has been poured into the tube, and mix with it the portion of soil which is to be examined, in quantity not more than will occupy 6 inches of the tube; pour the mixture rapidly into the tube, and let it stand in a corner of a room, or supported upright in any way. In half-an-hour it may be examined. The earths will have been deposited according to the size and specific gravity of their particles. The portion still suspended in the water may be allowed to settle; and there will appear in the tube layers of sand, clay, and humus, which may be measured by a scale, and thus the proportions nearly ascertained. When a farmer is about to hire a farm, of which the quality is not well known to him, he may be much assisted in his judgment by this simple experiment, if he has no time or opportunity for a more accurate analysis. For the glass tube may be substituted one of tin or zinc, 2 feet in length, with a piece of glass tube, a foot long, joined to it by means of a brass collar or ferule with a screw cut in it, which is cemented to the glass, and screws on the metal tube; and thus the instrument may be made more portable. When the water has been poured off, and the earths only remain, the cork may be taken out, and the contents pushed out on a plate, by means of a rod and a plug which exactly fits the internal diameter of the tube. They may thus be more particularly examined.

The result of various accurate analyses of soils shows that the most fertile are composed of nearly equal quantities of siliceous and argillaceous earths in various states of division, and a certain proportion of calcareous earth, and of humus in that state in which it attracts oxygen and becomes soluble, giving out at the same time some carbonic acid. No chemist has yet been able to imitate the process of nature in the formation of this substance; and the circumstances which are most favourable to it are not yet fully ascertained. Here is the proper field for the application of science and accurate chemical analysis.

As an example of an analysis may be useful to those who may desire to try the proposed method, we will add one actually made, under very unfavourable circumstances, and without any apparatus. The only instruments at hand were scales and weights of tolerable accuracy, three glasses, a foot long and $1\frac{1}{4}$ inch in diameter, belonging to French lamps, a tin coffee-strainer, a piece of fine gauze, and a very fine cambric pocket-handkerchief. A little muriatic acid was obtained at the apothecary's.

The soil to be analysed was taken from a piece of good arable land on the south side of the slope of the Jura mountains in Switzerland. Its specific gravity was taken as described before, and found to be 2.358 nearly. 500 grains of the dry soil were stirred in a pint of water, and set by in a basin.

To save time, 500 grains more of the same soil were weighed, after having been dried over the fire. It was well pulverised with the fingers, and sifted through the coffee-strainer, then through the gauze, and lastly through the cambric handkerchief. Some portion was left behind at each sifting. The two first portions were washed in the strainer and the gauze. The residue was sand of two different degrees of fineness, which, when dried, weighed, the coarser 24 grains, the next 20 grains. The earth and water which had passed through the strainer and the gauze were now strained through the cambric, and left some very fine sand behind, which, dried, weighed, and added to what had remained on the cambric when sifted in a dry state, weighed 180 grains. All that which had gone through the cambric was mixed with water in a jug and stirred about. The heavier earth subsided, and the lighter was poured into one of the lamp-glasses which had a cork fitted into it, and was placed upright. In about two minutes there was a deposit, and the lighter portion was poured into a similar glass, where it was left some time to settle. In this a slower deposition took place, and in about a quarter of an hour the muddy water was poured off into the third glass. The three glasses were placed upright, and left so till the next day. In the first glass was some very fine earth, apparently clay; in the second the same, but more muddy; and in the third nothing but thin mud.

The contents of No. 2 were divided between No. 1 and No. 3 by pouring off the muddy part into No. 3, after some of the pure water had been poured off, and the remaining earth into No. 1. They were then left to settle. As much water as appeared quite clear over the sediment was decanted off. The sediment was poured on a plate by taking the cork out of the tube, which was cleaned with a piece of fine linen, which had been carefully dried and accurately weighed. The plates were examined, and some of the lighter part, which floated on the least agitation, was poured from one plate to another, until it was thought that all the humus had been separated. Most of the water could now be poured off the earths, by inclining the plates gently, without any muddiness. It was, however, passed through a piece of filtering-paper which had been previously dried and weighed. The earth was slowly dried, by placing the plates on the hearth before a good fire, until they were quite dry, and so hot that they could not be easily held in the hand. The deposit left in the jug was poured on a plate, and a little muddy part, which was observed, was poured off with the water on another. This was again transferred, and the finer added to that which was in the second plate.

Collecting now all the separate portions, there were found,—

Of coarse sand	24	grains.
finer sand	20	
very fine sand..................	180	
clay deposited in the jug and first plate, dried................	240	
deposit in the second plate	24	
—— on the filtering-paper......	$1\frac{1}{2}$	
—— on the linen rag	$\frac{1}{2}$	
	490	

Leaving 10 grains to be accounted for.

Each portion, except the three last, was now put into a cup, and diluted muriatic acid poured over them; an effervescence appeared in all of them, which continued on the addition of diluted acid, and when the contents of the cups were stirred with a piece of tobacco-pipe. They were left till the next day, when all effervescence ceased, and the calcareous part seemed entirely dissolved; pure water was added to dissolve all the muriate of lime which had been formed. After some time, the clear liquor was poured off, and the remainder was strained through filtering-paper, and dried on plates before the fire. The earths were now found to weigh, respectively, 20, 17, 162, and 182.5 grains, having lost 4, 3, 18, and 57.5 grains of calcareous earth dissolved by the acid.

The soil and water which had been put by in a basin were

now repeatedly stirred and poured into a filterer, and more water was passed through the earth to wash out all the soluble matter. All the water was boiled down and evaporated, and left two grains of a substance which had the appearance of a gum with a little lime in it. Thus the loss was reduced to eight grains, a very small quantity, considering the means used in analysing the soil.

The corrected account therefore is as follows :—

Specific gravity, 2.358.

Siliceous sand ..	Coarse	20 grs.	199 grs.
	Finer	17 ,,	
	Very fine	162 ,,	
Calcareous sand	Coarse	4 ,,	25 ,,
	Finer	3 ,,	
	Very fine	18 ,,	
Impalpable earth	Clay...........		182.5
	Carb. of lime....		57.5
	Humus		26
Soluble matter			2
Loss			8
			500

Or, in round numbers—

40	per cent.	Sand,
36	,,	Clay,
17	,,	Calcareous earth,
5	,,	Vegetable earth, or humus,
0.5	,,	Soluble matter.

From the composition of this soil, it is evident that it is a most excellent loam, capable of producing, with good tillage and regular manuring, every kind of grain, artificial grasses, and roots commonly cultivated. The field from which the soil was taken was always considered to be of superior quality.

This example will suffice to enable any one to analyse any soil of which he desires to know the component parts, so far as they affect the general fertility. To ascertain minute portions of salts or metals, or any peculiar impregnation of the waters, must be left to practical chemists.

To those who may be inclined to try the analysis of soils it may be interesting to compare the results of their own experiments with some which have been obtained with great care. Thaër, in his very excellent work on rational husbandry, written in German and translated into French, has given a table in which different soils analysed by him are classed according to their comparative fertility, which is expressed in numbers, 100 being the most

fertile. This table is the result of very patient investigation, the natural fertility of each soil being ascertained by its average produce with common tillage and manuring. It is as follows:

No.	Clay.	Sand.	Carb. of Lime.	Humus.	Comparative Value.	
1	74	10	4	11½	100	
2	81	6	4	8½	98	Rich alluvial soils.
3	79	10	4	6½	96	
4	40	22	36	4	90	
5	14	49	10	27	..	The value of this could not be fixed, as it was grass-land; perhaps bog-earth.
6	20	67	3	10	78	
7	58	36	2	4	77	
8	56	30	12	2	75	Good wheat and barley-lands.
9	60	38	Very little carbonate of lime.	2	70	
10	48	50		2	65	
11	68	30		2	60	
12	38	60		2	60	
13	33	65		2	50	Barley-land, not fit for wheat.
14	28	70		2	40	
15	23½	75		1½	30	Poor sand, fit only for oats or buck-wheat.
16	18½	80		1½	20	

The specific gravity of these lands is not given.

IX.—*Account of the Improvements which have taken place in the Agriculture of Scotland since the formation of the Highland Society, &c. &c.: Essay to which the Society's Prize of fifty pounds was awarded.* By Mr. John Dudgeon, of Skylaw, near Kelso.

The influence which the patronage of the powerful and the rich exerts in the promotion of industry, independently of direct encouragement, is in no branch so conspicuous in its effects as in that of Agriculture. This seems to have been so long understood, and the importance of husbandry so universally admitted, that we read in the early history of all nations, celebrated for their advancement in civilization and the arts, the marked encouragement which agriculture received. The long duration of the Chinese empire, its extent, and population, and power, are justly attributed to the proud position given to agriculture, and the re-

spect bestowed by its emperors upon the plough, by condescending, personally, once a-year, in presence of the nobility and great officers of the empire, publicly to exhibit its properties and thus extend its use. In Persia a feast was yearly celebrated by the king, of which husbandmen were freely invited to partake at the table of majesty; and the great Persian prophet, Zoroaster, recommended the saint in the Magian religion to manifest his devotion by pursuing industriously the labours of the field. The Roman emperors, by their personal patronage, encouraged also the pursuit of husbandry, and this art was ever held by them in the highest estimation. Agriculture spread with the conquests of their arms, and, instead of their track being marked by the desolations which usually attend the march of the conqueror, the attention of the Roman captains being specially directed to the encouragement of the productions of the fields, the nations brought under the influence of Rome became early distinguished by a more advanced system of husbandry. There seems every reason to believe that Britain owed its first lessons in agriculture, as an art, to the Roman invasion. Besides the marks of extended cultivation which were left by the Roman soldiers, the very considerable quantities of grain exported from Britain during the sway of the Roman arms bear testimony to the fact, that the favour shown to the peaceful labours of the field by the conquerors, possessed a powerful influence in exciting the inhabitants to a more extended cultivation.

Subsequently, the Saxon Ruler of these isles being favourable also to the promotion of husbandry, agriculture still continued under them to maintain its influence among the people; but the introduction of the feudal system by the Norman conquest brought in unsettled times, and the proud and ambitious barons being more intent on distinction in a rude and cruel warfare, regarded with contempt a pursuit which accorded so little with their tastes, and which was rendered insecure by the internal feuds to which their more ignoble enterprises gave rise. Hence agriculture rapidly declined. A feudal kingdom has been rightly designated the encampment of a great army; and though the possession of land was the remuneration which the soldier received for his services, that possession was granted during pleasure, and so long only as the vassal could render sufficient military aid. To afford this service he was subject to be called away from his fields at the most important seasons, his superior being anxious only for military distinction, and, so far from patronizing, had no sympathy in the degraded occupation of husbandry. This sad state of matters prevailed during the lapse of many centuries, increased, perhaps, by the more systematic and serious dissensions of after-times. Until the return of quiet, and a more settled government, men

had no leisure to turn their regards to peaceful occupations, and hence the wars of the Roses and of the Usurpation had passed, ere we find agriculture beginning to command the general attention it so well deserved. Previous to this latter period, indeed, some valuable works upon agricultural subjects had been published, * but, from the causes already mentioned, they excited little general interest among that class whose influence enabled them to be of use in propagating the knowledge of the improvements recommended.

It was not, then, until the establishment of complete order, some time subsequent to the Revolution, that there appears to have been any material improvement in the ordinary practice of husbandry; though, no doubt, the extent of land devoted to agriculture must, from the growing amount of the exportation of corn during the early part of the eighteenth century, have been considerably increased. The comparative prevalence of domestic quiet now permitted those most directly interested in the improvement of the soil to turn their anxious thoughts to a subject so closely allied with their welfare, as well as the general prosperity of the community. Accordingly, in Scotland, in 1723, a number of landholders formed themselves into a society, under the denomination of "The Society of Improvers in the Knowledge of Agriculture in Scotland."

In this society we discover the first germ of the Highland and Agricultural Society of Scotland; and although from its limited numbers it did not accomplish much beyond the influence of its own members, yet to this patriotic body of gentlemen may be traced the introduction of some of those improvements, such as the cultivation of grasses and turnips, which, above all, have tended to raise the character of British agriculture. That the efforts of this society were not so generally extensive, and particularly that the example of its members was cautiously, and to a very limited extent, adopted by the tenantry, may in a great measure have been owing to the continued unsettled state of this northern part of the empire. Nor do we find that it was until the hopes of the exiled family had finally vanished, and internal peace been permanently restored by the accession of George the Third (1760), that such confidence prevailed as was necessary to induce men to embark capital on improvements where the prospect of return was necessarily at a distant day. Hence it was that, previous to this time, the force of patronage, and even the example of many enterprising landholders in Scotland, proved comparatively

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* *e. g.* Fitzherbert's Book of Husbandry; Tusser's Five Hundred Points; Sir Richard Watson's Work; Blythe's Improver Improved; Hartleb's Legacy, &c.

unavailing; and the progress which had been made in the art of agriculture in the southern parts of the kingdom since the establishment of order there, consequent upon the peaceful settlement of the Hanoverian succession, failed to extend itself to the still divided and harassed country of Scotland. But besides that the restoration of confidence, by the secure establishment of a settled government, led men to turn their attention to sources of wealth less immediate in their operation than those to which the prudent had hitherto resorted, the cultivation of the soil, subsequently to 1765, could not fail to attract greater attention from the great increase in the price of agricultural produce* which took place soon after the accession of George the Third. Accordingly it appears,—notwithstanding soon after this the balance of imports in the article of corn began for the first time very regularly to exceed our exports,†—that the cultivation of the soil throughout the empire, in extent, if not in improvement, nearly maintained its ground with the great increase of population consequent upon the return of personal security, and a state of national prosperity unexampled in the previous history of the country. Agriculture in Scotland, as having been at this time much farther behind, partook even to a greater degree of this improvement; and it is between 1765 and 1775 that we trace the opening of a better system, which had begun to be introduced at the commencement of this epoch. Still, however, husbandry, as generally practised in Scotland, continued in a comparatively rude state; and, notwithstanding the very laudable exertions of many patriotic landed proprietors in various parts of the country, to introduce, by example, a better order of things, no great progress appears to have been made,—excepting in some favoured districts,—in exciting the tenantry to depart from the long-trodden barren path pursued by them. It would appear, at this period, a great proportion of the arable land in Scotland was still very partially enclosed, so that even contiguous farms under tillage were not separated by any distinct fence. The ancient practice almost universally prevailed,—excepting in the neighbourhood of towns, and in those favoured districts alluded to,—of occupying farms as "*In-field*" and "*Out-field*," as it was called. By this mode of

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* Average price of wheat, from 1755 to 1764	. . .	*37s. 6d.*
1765 to 1774	. . .	*51s. 0d.*

—*Tooke's History of Prices*, vol. i. p. 31.

		Qrs.
† From 1742 to 1751	—Balance of *exports* of wheat	4,700,509
	All kinds of grain . .	8,869,190
From 1766 to 1755	—Balance of *imports* of wheat	1,363,149
	All kinds of grain . .	3,782,734

—*Tooke*, vol. i. p. 72.

management, the land near the steading or farm-offices received all the manure collected and prepared there, and thus an attempt was made to keep those lands for many successive years under a corn-crop, consisting of wheat, or more commonly of oats, bear or barley, and pease; and, although an occasional imperfect fallowing was introduced at the close of each rotation of six or eight years, the constant succession of corn-crops kept the soil in a continually impoverished condition. The out-field-land, which formed the bulk of the possession, was made to grow a succession of oat-crops, generally three, until, exhausted in strength and overrun with weeds, it was suffered, under the dominion of this new possessor,—and without any attempt being made to assist the herbage by the introduction of seeds,—to rest until the caprice of the occupier should deem it prepared to undergo the renewed attempt to produce another series of scanty crops. The only manure applied to this division of the farm was effected by occasionally folding the few live stock then kept upon detached portions of it, after which, in this case, it was expected to yield four or five corn-crops in place of three. Very little wheat was at this time grown in Scotland, and, even upon soils adapted for the successful culture of this grain, the short-sighted cupidity of many landlords prevented its more extensive cultivation, as being of an exhausting nature to the soil. The drill system of husbandry, especially during the early part of this period, was little practised in any part of Scotland, and the culture of turnips in this form, which at this time had its origin in this part of the island, entered only partially into the rotation of a few of the best farms. Potatoes were then only beginning to be cultivated in the fields, and the introduction of grass-seeds had not made any extensive progress beyond the *in-field* of the best districts. Improvements, however, made very rapid progress towards the close of the period under consideration, and the system of leases having come more extensively into use,—since the restrictions in entails affecting their extent was abolished by the act of 1770,—encouragement was afforded to tenants to expend more liberally and to embark farther in a species of speculation which now gave promise of considerable success. Hence, we find rents rose very considerably about this time, and many proprietors, who had expended largely in the improvements lately introduced, found themselves amply remunerated by an increase of rent, in some cases to nearly treble their value twenty years before.*

But as we approach the period of the formation of the Highland Society of Scotland, it will be necessary, in accordance with the required design of this essay,—in order to exhibit "the stages

* Wight's Present State of Husbandry in Scotland, vol. ii. p. 296.

of progress which Scotch agriculture has passed through" since that time,—to endeavour to describe more minutely the general system of agriculture pursued throughout Scotland immediately previous to the institution of this influential society.

Proceeding, then, with our history from the time to which our brief introductory sketch has brought it down, we now find that improvements in agriculture were steadily exhibiting their effects over a great part of the country; and, so great had been the efforts of an intelligent observation and the general spirit of enterprise among agriculturists during the last few years, that even among the tenantry the practice of some of those systems which have found most favour in modern days was in very general exercise. Many of these, no doubt, were far from being perfectly performed, though in their results, from being new, they were in many instances, as we shall afterwards see, fully as successful as in aftertimes; others were conducted in a rude and primitive style, owing in a great measure, perhaps, to the want of proper implements to execute the work in a sufficiently compact and orderly manner.

The practice of granting leases for a series of years was still gaining ground in those districts where agriculture was in favour; but the feeling which induced some proprietors,—in their anxiety to encourage enterprising tenants,—about the middle of the century, to grant endurances of unnecessarily long and even unlimited terms, had given place to a more judicious and prudent system. The rule at this period, and subsequently, came to be to restrict the endurance of leases to nineteen or twenty-one years; and where the principle of corn-rents prevailed to change these to money payments.

But we proceed to notice in detail the progress in improvements which had at this time taken place.* In all the best-cultivated districts it would appear that summer fallowing was now in very general acceptation, though, in the course of cropping, that essential requisite of good husbandry came much less frequently round than was necessary to effect all the good purposes of this practice. Nor do we observe much discrimination in the application of the system; but, like all new practices which had been found in the general attended by many advantages, it was adopted, without regard to circumstances, into universal use by all those pretending to any knowledge in their profession. In East Lothian, for instance,—for which district has been assumed the proud distinction of having led the way in Scotland to improve-

* The writer has been chiefly indebted for his information as to this period to "The Present State of Husbandry in Scotland, extracted from Reports made to the Commissioners of the Annexed Estates, &c. By R. Wight, Edinburgh. 1778 and 1784."

ment in husbandry,—we find in the general management a recurrence to a summer fallow only once in the course of seven or eight years; and though the turnip system had at this time made considerable progress in this county, there seems to have been a less frequent substitution of this crop for fallow than ought to have prevailed. These fallows were succeeded by a rotation of corn-crops, which also could not fail to render the return to a state of rest anxiously to be desired by the exhausted soil; and the cleaning process must have been no easy matter after a course of crops, of which the following are specimens, taken from the practice of some of the finest East Lothian farms, viz.:—

Fallow Dunged.
1. Wheat.
2. Barley.
3. Oats.
4. Pease.
5. Wheat.
6. Barley.
7. Oats.
Fallow.

Fallow Dunged.
1. Wheat.
2. Pease.
3. Barley.
4. Clover dunged.
5. Wheat.
6. Barley.
7. Oats.
Fallow.

Variation: Clover after No. 6 (Barley), in which case dung was applied on grass, and wheat followed.

Frequently the recurrence to fallow took place at the end of six or seven years; but still the prevalent practice of a succession of corn crops must have kept the soil in a comparatively foul and inefficient state. The rotations in this case were—

Fallow Dunged.
1. Wheat or Barley.
2. Pease or Beans drilled.
3. Barley.
4. Oats.
5. Pease.
6. Wheat.
Fallow.

Fallow Limed.
1. Wheat or Oats.
2. Beans drilled.
3. Barley.
4. Clover.
5. Wheat.
Fallow.

Or, following a better system, the fallow recurred sometimes after four years.

Fallow.
1. Wheat.
2. Clover.
3. Barley.
4. Oats.
Fallow.

In some of the instances specified above we find a practice prevailed of giving three, or sometimes four, furrows, previous to the repetition of the barley-crop; but, as this could be done only in late autumn or early spring, this sort of bastard fallow could serve no purpose with a view to the cleaning of the land: on the contrary,

would only tend to spread and transplant what couch-grass had been engendered.

In other parts of the country a system somewhat similar to the above prevailed, the great error of the time being the too frequent repetition of culmiferous crops, without a sufficient command of manure. In the Carse of Gowrie, in Perthshire,—a strong clay district,—we find the rotations on those farms most conspicuous for advancement, of a better description, thus :

Fallow with Lime.
1. Wheat.
2. Pease or Beans.
3. Barley dunged.
4. Clover.
5. Oats.
Fallow.

Or the Oats (5), followed again by Beans, and then succeeded by Wheat, which closed the rotation.

In Berwickshire, upon an extensive farm (1600 acres), where 100 acres had been fallowed and limed in one season, we find the rapacity of the improver inducing him to take the following rotation.

1. Oats.
2. Barley.
3. Oats.
4. Pease.
5. Barley, sown down.
6. Clover.
Pasture four years, followed by oats, barley, oats.

On lighter lands, where the cultivation of turnips had made some progress, and also upon those farms where grazing had found more favour, we recognise a better system of management, though here also the objection still generally meets us of a too anxious desire to scourge the land when under the operation of the plough. The latter we shall notice first, and take as an instance the farm of an individual, at that time the most extensive tenant in East Lothian, and who was held to have given more attention than usual to the improvement of land (very suitable for crops) by grazing. His mode of management and rotation were as follow :—

Fallow dunged.
1. Barley.
2. Clover, hay.
3—7. Pasture, five years.
8. Oats.
9. Pease.
10. Wheat.
11. Barley.
12. Oats.
Fallow.

In another instance we find the mode in use on thin clay-land to be—Fallow, without dung, oats sown down with clover and rye-grass, which were the first year cut for hay. Upon the hay-stubble a rich compost was applied, and the grass pastured for a few years. The ground was then broken up, and "after a *few crops of corn*, laid down again with grass-seeds."

Where turnips and potatoes had been introduced, a better order of things generally obtained, and this system seems invariably to have been attended by a more frequent adoption of artificial grasses in the course. These crops were not in all instances drilled, but this improvement was fast gaining ground. In the Lothians we have rotations of

1. Turnips drilled.
2. Barley.
3. Clover dunged.
4. Wheat.
5. Barley.
6. Grass, pastured.
7. Wheat or Barley, after rag fallow.
8. Oats.

1. Potatoes or drilled turnips.
2. Barley with ware, or seaweed.
3. Beans.
4. Barley.
5. Grass.
6. Wheat.

Or the land, sown with grasses on barley after turnips, was pastured for three or four years; the plan being invariably to cut the first clover-crop, and frequently even the grass of the second year. The soil thus managed was when broken up subjected to three successive crops of corn, viz. :—Oats, barley, oats; or oats, pease, barley. In Mid-Lothian, in the neighbourhood of Edinburgh, and where the benefit of manure from that town was, we find, very laudably called into exercise, the following rotation was observed :—

1. Potatoes, drilled and well manured.
2. Wheat.
3. Barley, sown down with seeds.
4. Hay, fallowed roughly, three times ploughed and dunged.
5. Wheat.
6. Beans, potatoes, and cabbage.
7. Barley.

On another farm, having the advantage of that manure, we have this rotation. Beginning at the grass after cutting the second year, a rag or bastard fallow, to which dung was applied: then

1. Wheat.
2. Oats.
3. Pease.
4. Potatoes and turnips, with dung to the latter.
5. Barley.
6. Clover.

It is in Berwickshire and the neighbouring parts of Roxburghshire, where Mr. Dawson, of Frogden, first introduced and perfected the drill culture of turnips, that we find that operation, even at this time, carried on in its greatest extent and perfection; and the rotation also following this crop best regulated to insure its most effectual and least troublesome repetition. Here we find, for example, some instances of the following rotation :—

1. Turnips.
2. Barley.
3, 4. Grass for two years, cut in the first.
5. Oats.
Turnips.

Being the very same which generally prevails in that district at the present day. It was also in the vicinity of this intelligent individual's farm that, animated by his excellent example,—where 100 acres of drilled turnips were often seen, it is said, at this far-off day, without a weed,—we find a spirit of emulation producing a perfection in the operation and spread of the cultivation of this invaluable crop, which at no very distant day fast made its way among the out-fields of this district. The greater part of the turnip-crop throughout the country was, however, still sown broadcast, and it must be noticed,—as indicative of the deliberate caution and want of enterprise which characterised the agriculturists of that time,—that, although Mr. Dawson's excellent and systematic plan had been nearly perfected fifteen years before the commencement of this epoch, it was only now beginning slowly to extend beyond the district thus distinguished by his spirit and intelligence. In the generality of farms where drilling prevailed, it was still commonly performed by making ridges of from three to four feet wide, upon the top of which one row of turnips was sown, thus, of course, forming a space of equal extent with these ridges between each drill. This, besides causing a considerable waste of ground, prevented the land acquiring the benefit of that fertility which accrues from a close and complete covering. Another mode of growing turnips was, after the land had been dunged, ploughed, and harrowed, to an equal surface, a drill machine was run by the hand along the field, the outside wheel forming the mark by which the return of the implement was conducted. The field was afterwards rolled, and when the young plants made their appearance they were thinned out by the fingers, without the use of a hoe: where drills were formed by the plough previous to sowing, it was no uncommon method first to spread the manure in rows upon the flattened surface—a mode which occasioned, it may well be supposed, great inequality in the rows.

From what has been seen of the mode of rotation in general use, it will be observed that recourse to artificial grasses had not yet been had to the extent which so excellent an improvement called for, and this appears chiefly to have been owing to the comparatively slight regard which was given to the maintenance of live stock, and the consequent increase of that mainspring of good husbandry, rich manure. That the advantages of maintaining a proportion of sheep and cattle upon arable lands were not earlier recognised has been justly attributed to the necessity which it was supposed existed to have annually in crop a large extent of surface, in order to make up the rental-bolls payable to

the landlord: for, until about this time, the great proportion of rents was exacted in kind. Besides, the necessities of the people had not yet imposed upon agriculturists the necessity, and at the same time, advantages to them of extending and improving their live-stock.

Implements.—As to the implements in general use, the old Scotch plough, a cumbrous machine, with its mould-board of wood, slightly sheathed with iron, and having little curve, was still the ordinary implement of tillage in a great part of Scotland. In the more advanced districts, this had some time before given place to the Rotherham or Yorkshire plough, as improved by James Small. This also, upon its first introduction, though having its mould-board of a very improved and more efficient curvature, had still this essential part, as well as the head to which the stock was attached, of wood. Since the adoption of this smaller implement, the use of two horses or oxen only, in the plough, became somewhat generally prevalent, but the usual power employed in this operation still continued to be three or four horses with a driver, or more generally two horses assisting two oxen. We may well suppose the work was not very nicely performed, when so unmanageable a species of draught was employed, especially when the old plough, which merely cut and raised the furrow slice, without reversing it, was used. Nor does it follow, that, in consequence of the application of additional strength in the operation, ploughing was effected to any greater depth than at present: on the contrary,—as in many parts of England at this day, where four horses are used in this work,—there is reason to believe that the soil was generally turned over in a very superficial manner. Hence, also, as we have seen, from the insufficiency of the implements, and the space required for the working of the cattle, the great width it was found necessary to preserve in the rows in the general mode of executing the drill husbandry.

It is believed there has been little alteration in the construction of the harrow in common use since the improvement of this implement suggested by Mr. Alexander Low, of Woodend, in Berwickshire, about the year 1770.

It is conceived to be unnecessary to enter into any further detail upon this head, and that it may be sufficient to mention that the implements of husbandry in general were very limited in number, rude in construction, and, comparatively with those of the present day, inefficient for the performance of neat and orderly labour. Carts, owing to the badness of the roads, were much smaller than at present, and they had their axles altogether of wood. When the drill-system was first practised, small hand-barrows, to sow beans and turnips, were in use, and a small

cleaning or weeding-plough, acted upon by one horse (to operate between the narrow rows), had for some time been of general application.

The threshing-machine, that prince of improvements, and liberal regulator of supplies alike to the necessities of the farmer's purse and to the comfort of the cattle in his folds, had not at this time been perfected. The ingenious inventor of this machine, upon the principle in present operation, had previous to this indeed constructed a wheel to move a set of flails, which met with some encouragement; but hitherto the barn-work was almost universally performed by the slow and imperfect operation of the hand-flail, which, besides that it rendered the personal attendance of the farmer, to the sacrifice of other matters, very unremitting, deteriorated materially the quality and condition of the grain in so moist a climate as that of Scotland.

Manure.—The use of lime in the culture of land seems to have been, at the period of which we speak, of very general application; and it was by means of this very valuable stimulant that so rapid an encroachment appears to have been made upon the large proportion of land possessed as out-field not very long previously. No great judgment seems, however, to have been generally exercised in its free use; nor did any general rule, even in the same district, obtain as to the quantity requisite to produce a given effect. Upon apparently the same species of soils we find this quantity vary from eighty to thirty bolls; and, while many preferred administering a large dose to effect the purposes of a lease, some renewed the application at each return of the fallow-crop. In either case, however, it was too much the practice immediately to exhaust the effects of this manure by too frequent a repetition of corn-crops, and thus to reduce the soil to a greater state of sterility than if no such stimulant had been used. Marl-pits were also pretty extensively opened in some of the higher districts of the country; but, excepting in the neighbourhood of towns, no manure, beyond what was produced on the farm, was ever applied.

In few respects were agriculturists so far behind as in the management of this essential requisite of successful cultivation; and, although we have seen there was at this time the embryo of nearly every approved practice of modern days, yet we find very few traces of any attempt to economise manures, or assist their fertility. Without noticing that in those times straw was generally very insufficiently "made down," as it is technically called, from the small number of cattle maintained in the winter season, the dung was allowed to accumulate in the yard, untouched, until it was required to be ploughed into the land. Hence it was

generally in so rough a state as to be but partially covered with the plough; besides that the previous fermentation, which science has discovered to be best fitted to supply the matter of nutrition to plants, and which experience has taught is most productive of a good crop, was unaccomplished.

Draining.—Under-draining seems at this time to have been very little practised, and, as we have only incidental notice of its existence, it may safely be concluded it was followed upon no systematic rule. All that was generally held requisite was to raise the ridges sufficiently high—and this was very much overdone—for the free percolation of the surface-water to the open furrows; and at this time the perfection of art had attained to little greater height than to form sufficient cross-furrows in the hollows and ridge-ends to prevent the collection of stagnant water on the face of the field.

Fences.—Subsequently to this period the general appearance of the country, where cultivation had gained a footing, showed comparatively bleak and open. Fences were few, and these generally of stone; while the numerous clumps and belts of plantation, which have been so laudably extended, and by which the climate of Scotland has been in general so much improved, were then confined to the immediate neighbourhood of a proprietor's residence. Thorn-fences were now, however, fast gaining ground; and these, being very frequently formed to present a double face, having a ditch in front of each, and a mound in the centre, upon which trees were planted, afforded tolerable shelter, and soon tended to give a more clothed appearance to the country. Still many of the fields remained unenclosed; and, as the grass-lands lay much by themselves, and those parts under culture were seldom in the rotation appropriated to grazing, no great pains were taken to preserve the thorns as a fencible enclosure, too frequently the tenant being satisfied that they afforded materials for repairing the numerous breaches, as, in its course, the fence was needed, or it might have been occasionally to assist as fuel.

Rents.—It is no very easy matter to ascertain with accuracy the comparative value which land yielded as rent at the time of which we speak, in relation to the present. The value of money has now very materially altered, as well as that of agricultural produce; and in making a right estimate it would require that we should be able also to distinguish the relative values of those two commodities at the respective periods. This being a problem which we have not the means to solve, and which we believe is capable of different solutions, according to the particular bias of the mind of the inquirer, it will be sufficient, as regards this general

view, that we endeavour to ascertain, so far as we are able, the money value which the land of certain localities and descriptions yielded at the time under review, leaving it to those who are curious in such discussions to draw their own conclusions.

In East Lothian, where arable culture was at this epoch most extensively practised, many of the rents were still payable in grain; but, estimating the amount according to the then average value of corn, the best lands near the coast (the rotation practised in some of which we have given, being partly occupied in the growth of turnips) yielded from 26*s.* to 30*s.* per Scots acre, this acre being about a fifth more than the English statute measure. Farther inland, and where the soil was stronger, but of a mixed character, several farms, now considered equal to any of this description in the county, appear to have been let at a money rent of from 21*s.* to 26*s.* One farmer, occupying 1800 acres between the shore and the county-town, to whom we have already alluded, paid upwards of 1600*l.* for his possession. In the higher parts of the district, 12*s.* and 14*s.* per acre were common rents; and it has been estimated that three-fourths of the arable part of the county were rented at not above 15*s.* per acre, at this era. The current leases of some of the finest lands upon the coast, eastward from Dunbar, belonging to the Dirleton estates, we find it stated * were entered upon about ten years before, at a rent of 30*s.* per acre. "These rents," it is added, "were formerly paid in grain; and, calculating the value of that grain according to the fiars (average) of the preceding twenty-one years, a considerable rise of rent appeared, though, as the value of grain gradually advanced, the rise was more nominal than real." † In Mid Lothian,—where no advantage accrued from vicinity to towns,—and in West Lothian, the rents of good lands varied from 21*s.* to 30*s.* per Scots acre.

Some of what are considered the best farms in Berwickshire now were then let at about 10*s.* per English acre; while others, not esteemed at present so good, though also of a superior description, yielded nearly 15*s.* In that part of Roxburghshire adjoining, those farms where culture had made some progress, and possessing no extraneous advantages, were rented

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* Farmer's Magazine, vol. xii. p. 346.

† From the comparatively advanced state which agriculture had attained in East Lothian at this time, there is perhaps less difference in the amount of rents there now than in any other part of Scotland; and it is believed that many of the farms above alluded to, though very much higher-rented during the war of the French Revolution, at the conversion to grain-rents which took place in so many instances subsequently, from the low price of corn, for some years after yielded very little more than the sums above stated.

on somewhat similar terms. The Carse of Gowrie rents we find stated about this time at 20*s.* to 27*s.* per Scots acre, though it is added, "the latest leases go from 40*s.* to 45*s.*" In Fife, the best lands appear to have brought 25*s.* to 27*s.*, but this rent was limited to a very few farms on the shore, for agriculture had hitherto made comparatively short progress in this county. With regard to the rent of sheep-farms, then, as at present, these were not taken by measurement, but according to a computation as to the number of sheep they would maintain, other circumstances of soil and shelter being considered; and the ordinary rent at that time, on the South Border at least, was from 2*s.* 6*d.* to 3*s.* and 3*s.* 6*d.*, for each sheep which it was calculated the land would keep.

In this sketch it will be observed that we have not adverted to other districts, where the value of land may have been, in some instances, higher, and where agricultural improvements may have partially made equally great progress at this time, as our object has been more to afford data by which a comparative estimate may be made in after-times of the rent of the best description of arable land in different localities, than to make the vain attempt to exhibit either the variation of rent payable for each description of land, or to show the distinctions which existed in different quarters. But it will be found in general that we have endeavoured to collect the instances given from those districts where agriculture at the time had been most extensively practised. It may be here mentioned, that in such districts the occupations were now becoming frequently very large, and many arable farms extended to 800 or 1200 acres, ordinary possessions varying from 300 to 500 acres. A few tenants held more than one of such farms, but in general this practice was not so common, nor were the farms so generally extensive, as at the present time.

Produce.—It can scarcely be expected that, at this distance of time, we should be able to afford a very accurate account of the annual produce of the different varieties of crops. There are two circumstances especially which operate materially against arriving at a just conclusion on this subject, one of which may be said to prevail at all times, viz., that partiality with which improvers are generally led to regard their own work, by which they are induced to select a favourable instance for their illustrations: the other arising from the indistinctness of quantity which obtains, as, in the statement of the produce in different districts, the measures of capacity, though varying in different localities, are seldom, there is reason to believe, sufficiently distinguished. The former circumstance we have been led to assume as having place in a great number of the estimates of produce which have come down to us, in consequence of these being in general so large, though no

doubt it is highly probable, when an improved system of management was primarily applied to those favoured spots where agriculture naturally first attached itself,—even when the operations were far from perfect,—that a higher produce was the result than obtains now under similar circumstances, where, by long-repeated efforts, the soil may be presumed to be comparatively exhausted. And this leads to the incidental remark that herein consists the pre-eminent superiority of modern agriculture, that under the disadvantages of continued culture it is thus capable of maintaining fertility.

We shall only attempt, then, to give such examples as may afford some criterion of comparison, and where we are best supplied with information; and take our instances from those lands in highest cultivation, or rather, combining this circumstance with the estimation in which the lands alluded to are held now, we are led to consider most capable of yielding a large produce, premising that these instances rather afford evidence of the *highest returns* of the time than of a fair average.* The first crop after fallow we generally find stated as yielding a large produce. When in wheat—converting the estimated produce into Winchester bushels—the general result may be given, on those fine soils, at from 30 to 40 bushels per Scots acre; the barley following, at between 36 and 48 bushels. The oats which followed were expected to give from 30 to 48 bushels. The pease, next in the succession, were held very precarious, varying from scarcely anything but straw,—which was held in considerable estimation,—to 46 bushels per acre. The wheat, upon its repetition after so many previous crops, we still find stated, in some instances, so high as from 28 to 40 bushels; while, as more naturally might have been expected, it is given as 24 bushels. The second crops of barley after this wheat,—previous to which the land, as in the first instance, indeed, received a sort of bastard fallow, being thrice ploughed,—gave 30 to 35 bushels; and the oats, which followed, produced 24 to 35 bushels per acre.

When the barley came first after fallow, 40 to 60 bushels per Scotch acre, it is stated, were not uncommon. After turnips, 42 to 54 was the general yield. The produce of barley, after turnips, in one instance we have met with, is stated at 60 bushels per acre. Then follows clover, succeeded by wheat, yielding 40 bushels per acre. Beans yielded 30 to 36, and were sometimes so high as 48 bushels per acre.

In some instances where land was newly broken up after five or

* These preliminary observations were considered necessary, from seeing, besides, that the average produce of England and Wales, even in later times, is estimated at very much under what is given below.

seven years' grass, we have a yield of 60 to 72 bushels of oats, stated as the result per Scots acre. The pease following were from 20 to 40, and the wheat after, 32 to 40 bushels per acre. In Perthshire, in the Carse-lands, the result is somewhat similar, but beans are frequently stated as giving much larger returns than that stated above. But it is considered unnecessary to go further with any minuteness into this examination, as there appears,—excepting upon the high and inferior land,—so great an equality of productiveness at this time throughout the country. This similarity is, no doubt, owing to the statements which have come down to us having been furnished only by those who were engaged in the application of recent improvements, and which had extended themselves hitherto to the best soils only of the respective districts in which agriculture had gained a footing. Hence, although the situations are different, there might be little dissimilarity of the land from which the results are obtained.

It is almost unnecessary to observe that universally, as might be expected, we trace a diminution of produce as we go down the list of repeated corn-crops; and this is peculiarly observable in following the progress of the productiveness of those fields reclaimed by liming, previously occupied as out-field. Upon the first application of this stimulant, upon breaking up these lands, we have success shown in production fully equal to the same application to the best in-field land, amounting to 60 bushels of oats per acre, and in some cases even more; but by the repeated return to culmiferous crops they gradually diminish, until, before being returned to grass, the produce is reduced to 18 and 20 bushels, if, indeed, they continued to bear corn at all. The result, however, of the whole examination is to show a much larger return than what, from the system pursued, and particularly the very frequent recurrence of corn-crops, could have been anticipated. And here it is worthy of observation, when we take into account this latter circumstance, in no more prominent light can be shown the great additional extent of cultivation which has spread on all sides over the country since the period under review. In 1780 the population of Great Britain amounted to little above 9,000,000; in 1830 to upwards of 16,500,000; and while, in the former epoch,—with no important variation as regards this matter in the amount of importations of grain,—the whole growth of this country did no more than maintain its inhabitants, in the latter, sufficiency was still produced for the whole population.

Live-Stock.—In no respect has the agriculture of Scotland been so much improved as by the great increase of cattle and sheep now maintained upon the arable land. Until the spread of the growth of turnips and clover, no more could be kept than what

the scanty produce of natural grasses, converted into hay, enabled the occupant of land to maintain during a winter of long endurance. And, as we have seen that a comparatively narrow extent of land was occupied at this time with these valuable crops, the number of cattle and sheep maintained was necessarily still very limited. It is accordingly in the border counties, from which the improved turnip system emanated and first spread to any extent, that we find the greater number of instances of care being given to this essential branch of good husbandry. The mode of fattening in this district was by stall-feeding, but it is evident no great improvement had taken place in rendering cattle susceptible of early maturity, since we find they were not fitted for the shambles until they had attained the age of four or five years. Throughout Scotland, generally, at this period, indeed, no particular variety of cattle seems to have been held in especial estimation. It is true, then as now, the Galloway breed prevailed in the south-western district, while the West Highland were held in equally high fafour in the northern counties. But in those parts where cultivation had made the greatest progress, though Bakewell's breed had been introduced ten years before by some spirited proprietors, and had been adopted by a few enterprising tenants, they had not been carried to any great extent; and from their having been injudiciously managed, and from indifferent keep in some cases, many even began to think they were not calculated to effect any improvement.

In like manner the Dishley, or new Leicester sheep of Bakewell,—which had been introduced about the same time,—from their having been attempted in high and unsuitable districts, had become liable to the suspicion that they also were not adapted to the climate of even the better parts of Scotland. Some very notable exceptions, however, existed, and this breed had partially found much favour in the Lothians, and particularly in the south-eastern counties; where, from their vicinity to that quarter of England where Bakewell and Culley's rams were held in such high estimation, a great improvement was effected on the indigenous cross breed of the country by means of these rams, for the hire of which a high price was paid. Folding upon turnips had also been practised to some extent in those parts where the cultivation of this valuable root was best understood; and we find as the result, that the sheep improved by this cross acquired a weight at two and a half years old equal to what the Leicester breed of the present day attain, with ordinary feeding, at from one and a half to two years; while the weights of the fleece are stated as being nearly the same with the improved breed now: we have to take into account, however, that, in the former period, salving universally prevailed, which materially added to the weight.

The Cheviot breed prevailed all over the southern border, and obtained there also—together with a cross of the indigenous sheep of Northumberland, obtained by an admixture of the Tees and Lincolnshire breeds—in many of the lower districts now possessed by the new Leicesters. The black-faced and native dun sheep, which occupied the more rugged and stormy hills, had now begun to be encroached upon by the Cheviots; and a favourite mode of effecting this end was by the introduction of the Cheviot ram, which, in the course of a series of years, accomplished a complete resemblance to the species of the male, though these flocks long remained inferior to the paternal breed. The short, or black-faced breed, maintained possession of the other mountainous districts of Scotland, and may be said to have been the only sheep in the Highland districts, though this part of the country was then much more occupied by black cattle; and we have at this time no trace of the valuable and extensive flocks of Cheviot sheep which now prevail there.

Upon the whole, from this rapid survey it will appear that many of the fundamental improvements in the art of agriculture had at this time an existence, and in some cases were even called into pretty extensive operation; but it is evident also that their efficiency was in general prevented from obtaining due development, mainly in consequence of an over-estimate of the power of those improvements, whereby their salutary influence was destroyed in many cases, by too large and too rapid a demand upon their expected efficacy. It is true the most approved systems, even as then known, had not extended far; yet the bright spots were so well scattered abroad, and in many places so favourably spreading out, that it was evident a spirit was in operation which, if it met with ordinary encouragement, promised, at no distant day, to beautify and enrich the land.

Nor were favourable circumstances now wanting to promote the advancement of agricultural improvement. The war with America, which had occasioned no inconsiderable interruption to the progress of trade and manufactures in Scotland, was now brought to a close (1783); and, soon after the restoration of peace, a period of prosperity and advancement followed, hitherto unexampled in the history of the country. The increased demand for all sorts of agricultural produce, consequent upon a higher rate of wages and the generally improved habits of the people, gave an additional impetus to agricultural exertion; and men's minds were naturally directed with greater interest to the promotion of a branch of industry so necessary and important to the growing prosperity and rapidly increasing population of the country. Concurrent with this favourable state of circumstances, the Highland Society of Scotland was formed; and it would be unjust, therefore, to at-

tribute the rapid improvement which, at this time, became so conspicuous and simultaneous in so many parts of the country, and for some time subsequently, in the first instance at any rate, to the efforts of this munificent body. It may with more propriety, in reference to this period, be said, that the Highland Society owed its existence to the spirit of agricultural improvement then called into exercise than that it originated this spirit. No doubt, although the attention of the Highland Society was, on its first institution, chiefly directed to that quarter of Scotland to which its name peculiarly bears reference, and its first volume of Essays and Transactions was not published until 1799, still the regard of the Society was early attracted to the promotion of agriculture generally throughout Scotland; and besides that the private influence of its members tended much to promote beneficial views to this end, useful hints were circulated by means of its advertisements, and a spirit of praiseworthy emulation was encouraged by its very liberal distribution of premiums, which tended to assist in disseminating the knowledge of those improvements which existed in other parts of the country.

But still the fresh spirit of improvement, induced by the greater prosperity, was, in Scotland at least, comparatively limited in its operation, and conceiving that no extraordinary impulse was given to agricultural exertion there, until the year following the season of 1795, we assume the epoch between 1783 and this period as that to which we shall rightly be able to apply a general description; and stopping at this latter period evidently best marks—as has been required—the first particular point of change which has arisen in the progress of improvement.

In general we find this era is more distinguished for the extended application of those principles which had already been in operation, than for the introduction of anything new in the art of agriculture. Besides the unprecedented increase of population which took place at this time, and which created a great additional demand for the ordinary descriptions of food, the improved habits of the people at large, and a more full and substantial mode of living, gave rise to a much more extended use of wheaten bread and butchers' meat. The increased luxury of the higher classes, in servants and horses, also operated a further demand; and new markets so near home being established in the increasing towns and villages throughout the country, imparted a spirit to the energies of the farmer, which were principally applied to the further reclaiming of those lands which had not hitherto been brought under the influence of the plough. It is highly probable more attention was given to these fresh lands, from much of what had been previously applied to the growth of corn-crops having become deteriorated, to a great extent, by the practice of over-crop-

ping already alluded to. No doubt the same cause which operated the necessity of an application to new soils tended to a more careful attention to rotations and a restricted use of grain-crops. Accordingly, it appears that, in those districts where agriculture had made most extensive progress during former times, a considerable improvement now took place in the system of rotations, particularly by the more frequent recurrence to artificial grasses and turnips, towards which improvement the high price of butchers' meat no doubt tended. A more perfect mode of cultivating the latter crop also now prevailed in a great degree, so that Dawson's system of sowing upon drills,—at twenty-eight inches apart, separately formed and made up by the plough, after having the manure applied in the centre of each,—may be said to be the only plan adopted in those parts where any pretensions were made to the knowledge of turnip-husbandry. The rotation practised with success by the most eminent farmers, at this time, we find so much improved as to be stated thus:*—

I.—On strong rich clays.

Fallow.	3. Barley.
1. Wheat.	4. Clover.
2. Beans.	5. Oats.

II.—On deep free loam.

1. Turnips.	4. Oats.
2. Barley.	5. Beans.
3. Clover.	6. Wheat.

III.—On light, weak, and gravelly soils.

1. Turnips.	3. Clover.
2. Oats or Barley.	4. Oats, turnips, &c., as before.

We should be mistaken, however, were we to suppose that this more gentle course—though far from unexceptionable, considering especially the mode in which some of the operations were performed—was the general rule of management on such lands at this time. We know that the frequent corn-crop system still prevailed, and the vicious mode—even when clover came to be adopted in the course, which certainly now became more frequently the case—of interposing two culmiferous crops and a crop of pease or beans between the fallow or turnips and the clover, even on light lands, was still very prevalent. Thus—

1. Fallow or Turnips.	4. Barley.
2. Wheat or Oats.	5. Clover.
3. Pease.	6. Oats or Wheat.

* Essay on Green Crops, by Mr. P. Brodie, Garvald, Haddington, Highland Society's Transactions, vol. i.

We must not omit to mention that the cause of agriculture received much valuable assistance at this time from the indefatigable exertions and patient industry of the late Sir John Sinclair, to whose unwearied perseverance the country was indebted for the institution of the National Board of Agriculture, under the auspices of which so much excellent agricultural information was shortly after disseminated throughout the country, through the medium of the statistical accounts and county surveys.

Implements.—It is deserving of particular notice, that during this period the threshing-machine, as completed in all its chief principles by Mickle, began to come into use, and though chiefly then operated upon by animal power,—so as to detract somewhat from its economy in labour,—its advantages were conspicuously felt, both in the superior efficacy of the operation and the improved condition in which it enabled the farmer to bring his grain to market. It was also of infinite use, in unfavourable seasons, in affording a speedy method of saving such corn as proved to be unfit to stack, or threatened to spoil when thus prematurely disposed of. In short, no other application of machinery to agriculture has been of such importance to the farmer in giving him a complete control over his crops.

Small's plough had now come into universal operation, excepting on some stiff soils, especially when first broken up from grass, or extraneous obstructions occurred, in which case the old Scotch plough was still in favour; and it was only then also that more than two horses or oxen were used in this implement. The latter,—for which a growing partiality appeared to exist during the last period under review,—had now given place, to a considerable extent, to horses, as being more fitted for the more general purposes of draught, to which the improvement of the times had given rise. As we consider it necessary only, under this head, to notice marked improvements, it may be enough here to state that drill-machines, for depositing in rows both grain and turnip-seeds, were now coming into use; and several new implements, though also of a rude construction, were being employed for horse-hoeing between the drills.

Rents.—The steadily higher rates which characterized the price of grain for upwards of twenty years immediately preceding 1795, in comparison with what they had borne in the earlier part of the century,* tended materially to continue to raise the amount

* The average price of wheat, from 1701 to 1766 was 32*s.* 1*d.*
„ „ „ from 1773 to 1784 — 48*s.* 8*d.*
„ „ „ from 1784 to 1795 — 50*s.* 2*d.*
—*Tooke's History of Prices*, vol. i. p. 83, *&c.*

of rents; and, the average rate of prices still going on to increase, we accordingly find that a further improvement took place in the value of land during the period now under review. Indeed nothing tends so much to show the steady advance which at this time marked the progress of agriculture in Scotland as the increased rental of the country since the close of the American war. At that period it could not have amounted to more than 1,500,000*l.* In 1795, it is believed to have exceeded 2,000,000*l.*

Live-Stock.—The more frequent recurrence of artificial grasses in the rotation of crops, and the greater breadth now devoted to turnips, caused a proportional increase in the quantity of live stock, to which the still further rise in the price of butcher's meat, of course, contributed. Hence, also, increased attention came to be given to the improvement in the form and size of both cattle and sheep; and the more frequent application of the Dishley or New Leicester ram, and of the Teeswater bull, was beginning to exhibit its effects in the somewhat improved quality of stock shown at the country markets. Still, however, not many entire flocks of the pure Leicester sheep were to be found at this time throughout Scotland; and the high price, in many cases, given for the hire of Bakewell and Culley's tups, as well as for Colling's bulls, by a few Scotch agriculturists, was rather to improve the native breeds of the country than with any ambition to generate a pure stock, which was still generally considered at this time unsuitable to the climate of Scotland.

But we hasten to go on to the next period as infinitely more marked and conspicuous in the bright career of Scotch agriculture. The epoch from 1795 to 1814 exhibits, indeed, an era unexampled in the history of improvement in any other country. Many favourable circumstances operated to produce this result, and that these events, equally applicable to the sister kingdom, did not produce so striking an effect in England, can be accounted for in part from the circumstance that she previously occupied a more elevated position in the scale of improvement. But the want of leases there, perhaps, more than any other cause, contributed to her having been outstripped in this laudable struggle.

Great Britain was now engaged in the heat of the war occasioned by the French Revolution; and, without going into the abstract question as to the general effects of war upon prices, there is no doubt that the peculiar character of that contest tended materially to affect the price of agricultural produce, both in this country and throughout Europe. The extensive military operations carried on over a great part of the Continent could not fail to interfere seriously with the productiveness of those countries where such distractions existed; while the obstructions to commercial in-

tercourse enhanced materially the value of our supplies from abroad, which at one time, indeed, were nearly cut off by the peculiar tactics of the enemy. These causes induced a greater attention to be devoted to agriculture here. But, above all, the great rise in price, chiefly attributable to the frequent recurrence of bad seasons at this time, tended to give an extraordinary impetus to agricultural energy. The average price of wheat, which had been under 50*s.* per quarter during the twenty years immediately preceding 1795, rose, in that year, to the average of 81*s.* 6*d.*, and in the subsequent year at one time reached 96*s.* The price, however, recurred to the average of 54*s.* in 1798, owing to the favourable seasons of 1796 and 1797; but a series of excessively high prices followed,* which was attended by a great degree of prosperity to all persons engaged in agriculture. No doubt, this great rise of price was occasioned chiefly, as we have noticed, by a cause which operated also to lessen considerably the disposable quantity of farm produce; but it has been demonstrated† that the effect of a deficient crop is to raise the price of the produce of the land greatly beyond the ratio of the defect, and, consequently, that a larger sum, in ordinary cases, is distributed among the growers after a year of deficiency, than is derived from medium or abundant crops. Besides, higher prices, from whatever cause, act in enhancing the estimation of the profits of that pursuit from which they are derived. Hence the profits obtained from agriculture came to attract attention, and a liberal application of capital ensued. Those engaged in the cultivation of the soil eagerly sought after information in their profession—more anxiously observed and copied the improvements of their more intelligent neighbours—and a praiseworthy spirit of rivalry generally obtained. The liberal premiums offered by the Board of Agriculture, and subsequently by the Highland Society, fostered this spirit, and were of great service in further diffusing the knowledge of approved experiments, and of the application of more correct principles.

The exertions of the Highland Society, now applied more generally to agriculture throughout Scotland, came more prominently into operation; and to the valuable publications of that patriotic body, and to the voluminous statistical information published under the direction of the National Board of Agriculture, are mainly owing the unexampled rapidity with which the improved system of husbandry spread over the land. Liberal premiums continued to be given by these munificent institutions, for communications on useful and approved details in the practice of

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* Of the 20 years from 1794 to 1814, the average price of wheat was 89*s.* 7*d.*—*Eton Tables.*

† Young's Annals of Agriculture for 1796, vol. xxvi. p.469.

agriculture; which, with the district competitions of the Highland Society, tended to foster and encourage that spirit of enterprise which was so fast gaining ground. These, again, gave rise to numerous local Agricultural Societies, which met with great and laudable encouragement from resident landed proprietors, and excited great interest among the tenantry. The object of these local societies was principally directed to the improvement of the various breeds of live-stock deemed most suitable to the respective districts in which the competitions were held, and proved of incalculable benefit in quickly disseminating improved varieties throughout the country.

The greater interest which came to be bestowed on agriculture generally also gave rise at this time to numerous other useful publications on this important subject; and among these deserves particular notice, as having been highly instrumental in this work of rapidly-extending improvement, 'The Farmer's Magazine,' commenced at Edinburgh in 1800. Although, no doubt, we fear we must admit that no small prejudice exists among the generality of farmers with respect to the utility of information thus acquired, yet it is impossible to deny the powerful influence of the press in effecting a revolution even in this unobtrusive art, in spite of such feelings. It is true, some discrimination is required to avoid the evil, and choose the good, from many such publications: yet the intelligent man, having made his selection, and cautiously, if need be, entered upon his experiments, success no sooner attends his efforts than the result—as all operations in husbandry (from their nature) are openly displayed—becomes known to his observing neighbours, and the improved practice passes into general use.

A combination of so many favourable circumstances soon became evident in the rapidly improved face of the country. The liberal returns from agriculture gave rise to an increased application of capital to the soil, to an extent indeed, in many instances, which—as matters turned out—in the end frustrated the accomplishment of individual reward. A spirit of intelligence prevailed more generally among those engaged in husbandry, and more judicious and correct principles came to be applied in the chief operations of the farm. A further improvement took place in the system of rotations: clovers were now extensively cultivated; a great breadth of land which had been managed by an imperfect fallow was applied further to turnips; and it came to be the universal rule that clover, or some description of fallow-crop, was interposed between every two culmiferous crops. But the order in which cropping was pursued was beginning to be regulated, not so much by any fixed rule of rotation as by the application of correct general principles, varied often according to results: still the most common

rotations, on free good soils, with some depth, came to be turnips, wheat or barley, clover and rye-grass, oats. On the thinner lands of this description the general plan was to pasture for two or more years. The strong, thin clays were commonly subjected to a rotation of fallow, wheat, clover and rye-grass, and oats; while, upon those of more depth, and of a generous nature, the rotation was more varied, and a larger demand was made upon the soil, viz.: Fallow, wheat, clover and rye-grass, oats, beans, wheat, and a return again to fallow. Sometimes the clover was postponed and the cropping made in this order:—fallow, wheat, beans, barley, clover, oats; but as a general system this must be allowed to be open to the objection, that, if an unfavourable season occurred in the operation of fallowing, or in the preparation for beans, the land would be out of order for the reception of the grass-seeds.

It was thus the more frequent recurrence of leguminous crops which formed the marked distinction of the improved practice of the period; and, besides that it was a condition in most leases that no two white crops should follow each other in succession, most farmers had now become aware that little profit would accrue to them from such a practice, excepting where there existed such a command of manure as enabled them to counteract the consequent deterioration of the soil. The more judicious alternation of crops had, no doubt, been productive of this requisite to some extent; but the supply of dung in ordinary cases, it is well known, is barely sufficient, from a given quantity, to maintain the generality of land in good heart under the gentlest mode of treatment.

Manures.—To this important branch of good husbandry a growing attention was now paid; the soiling of cattle in hammels, and the larger supply of turnips, contributing materially to the increase, as well as quality, of the manure. Straw, from the greater abundance of better food, was now in much larger proportion supplied for litter to cattle, and this, being richly saturated with the excrementitious matter of animals now fully fed, afforded a dung-hill, even applied in the same quantity, of more than double the productive effect. Besides, these dung-hills were now carefully laid out to undergo the necessary process of fermentation, suited to the different crops and varieties of soil, and, when applied to the land, every economy was used in the time and mode of application. Great attention came also to be paid in collecting extraneous vegetable matter, scourings of ditches, &c., for the making of composts; and that of Lord Meadowbank particularly, of peat-moss and farm-yard dung, was now in high favour. Lime continued to be applied liberally, though perhaps scarcely to the same extent, in those districts where it had formerly been so freely used, or rather

abused. The state of the land to receive this valuable stimulant, and the proper effête condition of the lime at the time of application, was now, however, better understood, and thus that important manure came to be more economically and advantageously employed. Still, beyond this, a very limited quantity of foreign or extra manure, compared with the present time, was used by farmers in Scotland. Bones, although in use at this time in many parts of England as a manure, it would appear were scarcely known on the north of the Tweed, even so late as 1812, to possess any virtue of this kind, as we find a correspondent of the Farmers Magazine of that year stating the practice of our southern neigh bours in this respect as an important discovery. Neither does the application of rape-cake to the soil seem to have obtained in Scotland, until some time subsequently to the period now under review.

Draining.—As it may well be supposed, no great extent of improvement could be effected in Scotland without the essential work of draining forming a material part of the amelioration, so this operation was now much more extensively carried on. Underdraining was, however, still very imperfectly practised, and, in most cases, upon no particular understood principle. It was, generally, only where spouts or springs made their appearance on the surface that any attempt was made to remove the evils of superabundant moisture. In part, Elkington's method formed the basis of the practice, but it was generally very much subject to be varied by the caprice of different operators. The Highland Society early directed its attention to the efficient introduction of this system into Scotland; and when the Board of Agriculture—besides having procured a reward of 1000*l.* to be given to Mr. Elkington—sent Mr. James Johnston to England to get instructions in his system, the Highland Society patronized the publication by Johnston of a treatise on this method of draining, and recommended it strenuously to the public. It was generally considered, as thus recommended, too expensive an operation for general adoption by tenants, and met with no great favour from them, excepting in a modified extent; nor has the system, when more carefully followed out, been in many instances attended by anything like complete success. In short, great deficiency and imperfection still characterized this department of rural economy.

Implements.—It was not so in the branch next to be noticed. Here a marked improvement had taken place, and we find, though not perhaps in equal perfection, almost every approved implement of the present day. The use of these was now also greatly extended; and, wherever arable culture was practised, not only does

it appear that effective implements were in operation, but these were commonly the manufacture of a resident mechanic. The Scotch plough had been entirely superseded; and it was rare anywhere to find oxen employed in agriculture, or more than two horses in an ordinary plough. It was during this period that John Wilkie, an ingenious mechanic in the West of Scotland, effected considerable improvement upon this fundamental implement, and succeeded in forming it efficiently of malleable iron; which material, as possessing greater strength and durability, soon crept into favour, and is now of nearly universal application in the manufacture of this implement throughout Scotland. Improved implements were also applied to drill husbandry, both for depositing the seed more equally in the rows, and for efficiently cleaning the land between the drills. But above all the threshing-machine, upon which considerable improvements had been made, had established itself so universally over the country, that upon scarcely any farm of above 150 acres of arable land was there not one to be found. Animal power was at this time most commonly applied to this valuable machine, but the application of water and wind had now become very frequent upon large farms. It is believed steam had also in a few instances been employed, as the moving power to threshing-machines, before the close of the period.

Live-Stock.—The great rise in the price of butcher's meat, during the war, gave prodigious encouragement to the production of live-stock, and caused increased attention to be given to this important branch of husbandry. As, during the last period under review, a considerable addition was made to this kind of produce, greatly owing to the extension of an improved method of arable culture, so it appears highly probable that the rapid advance of the clover and turnip system was now much favoured by the extraordinary demand for butchers' meat, to which the better condition and increased luxuries of the people now gave rise; for there can be no doubt that the improved mode of tillage is productive of a much greater weight of this necessary commodity.

There is no statistical information upon this subject by which a comparative estimate of this increase can be correctly formed, but there is reason to believe, taking into account the increased number of inhabitants supplied, and their greatly improved condition, that it could not have amounted, at the close of this period, to less than 30 per cent., compared with what it was at the beginning, upon the number of cattle alone; and we have no doubt the increase upon that of sheep, independently of their improved weight, may be taken at fully more. It was in a great measure owing to the improvement in the breed of stock, by which earlier maturity was accom-

plished, that this large increase was effected. To this result the Highland Society mainly contributed. From its earliest institution this munificent body established and encouraged, by liberal premiums bestowed at district shows of live-stock, the purity and improvement of the best native breeds — the West Highland, Aberdeen, Angus, Fife, Ayrshire, and Galloway cattle, and Cheviot and black-faced sheep. And though its attention was subsequently directed to promote the introduction and use of the finer and larger breeds, where that seemed to be practicable or desirable, little had been done at this time in that way. Numerous local societies, however, sprung up, which devoted themselves chiefly to this end, and proved of infinite service in spreading the knowledge of the superiority of the pure breeds; and were, above all, eminently instrumental in introducing the more extensive application of these finer and larger species. Before the close of the epoch now under consideration, accordingly, the prevalent use of the short-horned bull, in many parts of Scotland, became very conspicuous in the improved character of the lowland breeds of cattle; while, in the pure Teeswater, a few agriculturists on the south-eastern border began to vie with their southern neighbours. But it was in the improvement of sheep that at this time most progress had been made, especially in the district just alluded to. The new Leicester sheep had now possession of a great part of the arable land of those counties. These were not indeed in all cases the pure Dishley stock, but were more commonly the result of repeated applications of the male to the Cheviot or native Berwickshire breeds; and while, in their appearance and chief excellencies, they came to resemble the pure breed, they were perhaps, from their maternal origin, better fitted for the less favoured climate into which they were introduced. The pure Cheviot, displaced in some degree on the lower, still continued to gain ground on the higher districts; and this period is particularly remarkable, as that of their extensive introduction into the Northern Highlands, where they have proved so eminently successful. An attempt was also made to introduce there and in some other parts of Scotland, as a cross, the Southdown and Merino breeds, about this time, which however has not proved successful.

Rent.—But what, above all others, is indicative of the astonishing degree of improvement which accrued during this period, is the unprecedented rapidity with which the rent of land got up. There is every reason to believe that the estimate which states the rise of the arable portion of the land in Scotland to have amounted to considerably upwards of 100 per cent. is nearly correct. We have seen that, in 1795, the rental has been given as amounting

to 2,000,000*l.* In 1815 the total rental of Scotland, exclusive of houses, amounted to 5,278,685*l.* "It is difficult," says Mr. M'Culloch,* "to decide as to the share of the entire rental to be set apart as the rent of 14,000,000 of uncultivated acres, but there are good grounds for thinking that it does not exceed 850,000*l.*" Now this would leave a balance, as the rent of the arable land at this time, of upwards of 4,400,000*l.*, showing an increase of 2,400,000*l.* in the short space of twenty years! "So rapid an increase of rent," adds Mr. M'Culloch, "is probably unmatched in any old, settled country."

Produce.—It is to be regretted we have no sufficiently accurate statistical materials from which a correct estimate can be formed to what extent the increased *value* of agricultural produce warranted so extraordinary a rise in the value of land. There is little doubt this increased rental is in this instance beyond the proportion of the *further price* of agricultural produce, and therefore can only be accounted for by the *additional amount* of the productiveness of the soil under a better system of management. We should be inclined to think the produce, in average seasons, at the latter end of this epoch, from good descriptions of land, may be assumed as—

Wheat,	26 to 28	bushels per	English statute	acre.
Barley,	38 to 42	,,	,,	,,
Oats,	44 to 46	,,	,,	,,

While the lighter and thinner soils, under the same circumstances, would yield of—

Wheat,	18 to 22	bushels.
Barley,	27 to 30	,,
Oats,	30 to 35	,,

There was at this time still a great breadth of a lower description of land, affording a less certain, as well as generally a greatly inferior return, which will bring this estimate perhaps even lower than the general average for Scotland adopted by Mr. M'Culloch in his Statistical Account,† of 24 bushels for wheat, 28 for barley, and 36 for oats.

We may fairly then conclude that, besides the greater extent of land which the increased quantity of manure, arising from additional stock, enabled the farmer to cultivate better, the whole value of this increased stock was a clear addition to the produce of the soil; and, consequently, to the farmer's means of paying rent.

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* M'Culloch's 'Statistical Account of the British Empire,' vol. i. p. 530.
† Page 537.

We now proceed to bring down the survey to the present time,* and, it is presumed, we shall—after the description which has already been attempted to be given of Scotch agriculture, in surveying its progress—best perform the task (so far as the general view is concerned) of describing the system of husbandry which at present obtains, by now noting only the chief improvements which have been introduced since the close of the period last under review. But before doing so it will be right to take a general glance of the position which it now occupied, and the chief events which characterised its progress.

It may be observed, then, that this last period throughout is peculiarly marked by the greater intelligence which came to be applied to the pursuit of agriculture. The desire for correct information, which at the close of the former period began more generally to prevail, was early gratified by the publication of many useful works upon husbandry, and accounts of the improved practice which so generally obtained. Among them deserve to be particularly distinguished the vast amount of statistical information connected with the agriculture of Scotland, and the accurate description of the prevalent systems, collected and systematically arranged, under the patronage and direction of the Board of Agriculture, by the indefatigable exertions of its amiable and persevering president, Sir John Sinclair. These were mainly instrumental in diffusing the knowledge of better practice, and powerfully contributed to dispel prejudices in quarters where they were known to be most obstinate. The Highland Society too continued to extend the offer of its premiums to subjects connected with the general agriculture of the country; but it was not until a subsequent period of this epoch, and after the unfortunate dissolution of the national board, that the former became so conspicuously the patrons of the farmer. Still the exertions of this patriotic society, now embracing in the list of its members all the opulent and powerful throughout the country, and spreading its ramifications wherever a desire for encouragement was expressed, even at this time, did not fail to act powerfully upon a class, now so anxious to profit by the spread of additional information. The majority of large farmers were now men who had received a liberal education, and were many of them distinguished by that spirit of

* It has been thought best to include the whole of this time in one epoch; for, although, during the earlier part of it, agriculture received a check in its *resources*, which was attended in many instances by individual suffering, and in all, it is believed, by no financial addition, its *progress* was in noways paralysed; on the contrary, there is reason to suppose the very difficulties it had to encounter were no greater on the whole than excited to new enterprise and tended to the development of further improvement.

intelligence and inquiry which is so favourable to the development of improvement through the application of known principles. They were not contented with following old-established rules without being satisfied that they were formed upon rational data, and many practices in the detail of agriculture maintained by prejudice came to yield to the application of correct reasoning. The Highland Society's exertions, therefore, came now to bear with increased force; and as they were met by a more eager desire, both to communicate and receive information on the part of agriculturists, the sphere of the Society's operations were, about the middle of this epoch, very considerably extended. Its transactions, which had been published at long intervals, and which had reached only to six volumes of rather an inaccessible form, previous to 1828, were now given to the public quarterly through the medium, and as an appendage, of that excellent work "The Quarterly Journal of Agriculture," which at this time took the place of the old "Farmer's Magazine," a short time before discontinued. This proceeding has proved of inestimable advantage to agriculture, in disseminating more widely and expeditiously the many excellent and highly useful communications, on every branch of agriculture, which the liberal and increasing premiums of the Society have called forth. The aid of science has thus been more extensively called in, to assist in culture—new manures have been encouraged and extended—encouragement has been given to the application of more correct mechanical principles to the construction of implements—diseases of live-stock have been investigated, and thus mitigated or removed—experiments have been instituted which have given rise to greater economy in feeding—draining has been encouraged and extended—and there is no branch of rural economy which has not partaken of the benefits of the patronage and encouragement of this munificent Society. More especially, also, its care and interest came now to be given to the introduction and extension of improved descriptions of live-stock; and, in addition to the district shows, which were almost specially devoted to the improvement of the native breeds, the establishment of the grand shows held annually in the chief towns has tended to excite an interest which has, besides other considerations, been eminently conspicuous in spreading the taste for a finer and improved stock. In short, the attention and influence of this patriotic body being now extended principally to agriculture, it well merited the additional title which it has assumed, of "The Agricultural Society of Scotland." The Prize-Essays and Transactions of this Society, being now so easily accessible and quickly disseminated, as might be supposed, could not fail to create a great interest in so intelligent and well-educated a class as farmers had now become; and the effects were soon discernible in the perfection and scien-

tific manner, in which many agricultural operations came now to be carried on in Scotland.

Chemistry and mineralogy have been called in to assist in the promotion of new modes of improving the nature and capabilities of the soil, while botany and vegetable physiology have been, in many instances, brought successfully forward to point out a method of cropping suited to surmount obstacles which have interfered with the success of certain crops. In short, if we were required, in one word, to characterize the present state of agriculture, from that of former periods, we should say, that it is now more pursued as a *science.* It is true all may not be regulated in their practice by original conceptions, founded on such high authority; but, from the general intelligence and acute observation which pervades the whole class, successful management is sure, at no very distant time, to attract imitators among those who may be less inclined to lead. The day, it is hoped, is now gone by when to the farmer can be applied with justice the obloquy of imperturbable and culpable adherence to antiquated practices; and he may now, we presume, fairly maintain his title to a share in the commendation, which justly belongs to the other industrial classes of this country, for activity and enterprise.

But, while the progress of improvement in agriculture has gone pretty steadily on to this result, its success has not been, as during the former period, so uniformly great; and its history in this respect displays a more chequered aspect. The great fall of prices which took place about the close of the war created a reaction, which soon told with severity upon a numerous class of agriculturists. Rents, which had attained an unnatural elevation, from the confidence inspired by so long a continuance of high prices, occasioned a great embarrassment to the majority of tenants. Hence a period of severe agricultural distress early began to manifest itself. The price of wheat, which for the previous five years had averaged upwards of 108*s.* per quarter, fell in 1815 to 53*s.* 7*d.*, and in the January of the following year to 52*s.* 6*d.*; and, although there was a revival of prices to a considerable extent, owing to the deficient harvests of 1816 and 1817, Scotland did not participate much in this improvement, as that deficiency arose from a cause—the lateness of the seasons—which materially influenced the productiveness of the crops in this part of the kingdom. The crop of the following year proved, indeed, productive; but, a different result being early anticipated, and alarm being easily excited, from the previous short supplies, an unprecedentedly large importation, amounting to upwards of 1,500,000 quarters, in this year, depressed prices again beyond the fair ratio, and occasioned such an accumulation as operated to keep grain under a remunerating price for many years. A severe check was thus given to agricultural

energy in many places, generally most felt in those districts where operations had been carried on to such perfection as to induce a freer recourse to corn-crops than was consistent with the ultimate preservation of the soil in good heart. In East Lothian, for example, at this time, much distress prevailed, until the high rents prevalent there were adjusted according to a principle having reference to the comparative value of grain at this time with that which existed at the entry to the farms. In other cases, leases entered upon during the prevalence of high rents were fast lapsing; and under a more equitable adjustment of rents a fresh spirit of enterprise ensued, which, favoured by the very difficulties which now presented themselves, excited to new exertions, and gave rise to new modes of management, which proved successful in mitigating the threatened distress, and ultimately tended to the advantage of both the occupier and the land. We allude to a more extensive system of grazing, which now became prevalent in some of those districts hitherto entirely, and perhaps, under any circumstances, too exclusively devoted to the production of corn-crops.

The agriculturists of Scotland partook also in the depression which characterised the state of the other industrial classes of the kingdom in 1824-5; but since that period, though certainly not at all times in a flourishing condition as respects their finances, they have gone on in a steady progressive state of improvement, and have added by their economy, ingenuity, and intelligence greatly to the increased resources of the country. It is by this greater productiveness that they have been enabled so well, in spite of a much lower range of price compared with rents, to bear up against a course of circumstances which otherwise must have overwhelmed them; and we need no other proof of the further improvement in Scotch agriculture, since the period of the war, than a comparison of the rents during the war and subsequently, with the now decreased value of agricultural produce. It is to be regretted we have no means with perfect precision accurately to know the comparative amount of these rents, but it seems very generally to be allowed that the decline which took place in the first ten years of this period has been very materially made up by the rise which has since occurred; so that the rental of Scotland, it is confidently assumed, may now be held equal to what it was in 1810.* The rents being, then, the same in 1810 and 1837, we find the average price of wheat and barley for ten years previous to these years respectively to stand thus:—

	Wheat.	Barley.
From 1800 to 1810	81*s.* 2*d.* per qr.	41*s.* 5*d.* per qr.
,, 1826 1837	55*s.* 8*d.* ,, ...	31*s.* 4*d.* ,,

* M'Culloch's Statistical Account, vol. i. p. 539.

Butchers' meat and wool, we have reason to believe, were also considerably higher during the former period: so that, assuming agricultural capital to have yielded an equal return at the two periods, we are compelled to the conclusion, that in productiveness our fields have nearly doubled since the beginning of the century. Now, we know that, though this preliminary assumption is far from the truth, it would be much more incorrect to suppose that the whole apparent difference which this article of price exhibits found its way into the pocket of the farmer of the former period: on the contrary, we believe that the great proportion of this difference of price is made up to the farmer of the present day by increased productiveness, perhaps, to the amount at least of 70 per cent.

This result, it is confidently presumed, has been chiefly brought about during the period now under consideration, and has been mainly effected by the judicious intermixture of the feeding and grazing of live-stock with arable culture; by which, not only has the soil been brought to a greater fertility when under culmiferous crops, but to produce all the additional live-stock now kept as clear disposable gain. To increase the amount of this live-stock has been the chief care of the successful farmer, and has led to many of the greatest improvements in the husbandry of modern days. The great extent to which draining, for instance, has been lately carried, in a great measure, is owing to the desire to produce an additional breadth of turnips, that more live-stock may be maintained. Foreign manures have also been introduced, and liberally employed with a like end; and even the climate has acquired great amelioration from the extensive plantations which have been executed chiefly with a view to afford shelter for sheep. Of these improvements it may be right to say something in detail.

Draining has been much more extensively and systematically performed during the whole of this period. In the earlier part of it, that system had been in general use which had for its object the intersecting of springs, or of the oozings of under-water forced from a higher surface. This was accomplished by means of drains cut generally at right angles with the line of the ridges, or across the slope of the ground, sufficiently deep to reach the porous stratum through which such spouts found vent; and the usual method was to form the line of drain immediately above that where the indication of superabundant moisture appeared, leading it off to the nearest open ditch. These drains are of various depths, according to the nature and distance from the surface of the strata in which the water is found, but four feet may be considered the ordinary extent to which they are carried; frequent wells or bores being added along the line of the drain, sometimes on Elkington's principle, to reach a pervious vent for

the water, or, where the drain has failed in every part to reach the porous stratum, to catch additional water to carry along its line. No materials have been found equal to stones for filling these drains, and the use of other substances has almost invariably been attended by ultimate disappointment. It was a common practice to make these trenches of a great width, and to fill them within a short space of the surface; but, besides that such drains gave occasion to too large a size of stones being used, and, by consuming also an unnecessary number, increased materially the expense, they were much exposed to accident, from being disturbed, and thus injured, by the plough. When properly executed, these drains are seldom made wider than ten inches at the bottom, when a regularly-formed conduit is held unnecessary; and in this case the stones are broken to not more than two pounds weight, carefully deposited with the hand, and being closely finished on the top with small broken stones, or rough gravel, and slightly covered with straw, they ought in no case to be filled nearer the surface than 16 to 18 inches.

Furrow-draining has also been extensively applied on the flat alluvial and thin clay districts of Scotland within this period, particularly in the districts of Stirling, Perth, and Ayrshire, where the liberality of proprietors has been, in many instances, very properly called into exercise to assist in an operation which can only be properly effected through such instrumentality. These drains have been generally applied to every furrow where the ridges are wide, and their common depth is from 24 to 30 inches. Tiles have been extensively used as the medium of carrying off the water in such drains; and, of late, from the greater cheapness with which they can be furnished—since the application of machinery in their manufacture by that eminent friend to agriculture, the Marquis of Tweeddale, and some other ingenious individuals—their use has been very generally extended. More particularly we ought to mention, that, within these very few years, numerous tile-works have been brought into operation, with this view, in East Lothian, where this system of draining, and that to be immediately noticed, have been very extensively practised, and are in daily-growing repute.

The system to which we allude, and which has latterly found much favour, is an improvement upon this last, perfected and first extensively practised in Scotland by the ingenious Mr. Smith, of Deanston in Stirlingshire. This intelligent and enterprising gentleman has, by means of this system of draining, and the free use of the subsoil-plough—of which useful implement he is also the inventor—converted a formerly barren, cold, and impervious soil into useful turnip-land. His example has been laudably followed by others; and, although the system has not yet had time to be

very extensively applied, it is now happily in a fair way of quickly working a revolution in many parts of Scotland, rendering land, which was scarcely worth 10*s.* an acre, equal to double and treble its former value. The object of this effectual method of draining may be said, in comparison with that first noticed, to be rather to prevent the pernicious effects of superabundant moisture than to remove the cause of it; and the principle of the system has been described by its author as "the providing of frequent opportunities for the water rising from below, or falling on the surface, to pass freely and completely off;" and therefore he has appropriately designated it "the frequent drain system." However desirable it would be here to give a full detail of the mode of operating so important an improvement, it would be inconsistent with the design of this essay, and occupy too much space, to enter upon it with such minuteness as would be available for practice. We must therefore be contented with referring to the very clear and intelligent description of the system by its author, as published in a cheap form by Messrs. Drummond, of Stirling. It may be enough at present to say, as descriptive generally of the manner of executing the work, that after main covered drains of greater depth have been carried along the hollow parts of a field, into these are conducted narrower and shallower parallel drains, filled with small stones, at regular distances, varying from 10 to 40 feet apart, according to the nature of the soil. These are directed to be carried "*throughout the whole field, without reference to the wet or dry appearance of distinct portions;*" and it is recommended to lay out the ground, after the operation is concluded, without ridges. The expense, as given by Mr. Smith, is estimated from 3*l.* to 12*l.* per acre, according to the frequency of the application; and as, to be substantially performed, it is an improvement which requires the assistance of the proprietors of the soil, it is to be regretted they have hitherto in so limited a number applied themselves to the extension of an improvement so eminently calculated to effect a change so devoutly to be wished, as fraught with such important consequences to the country.

A modification of this principle has been, in some lands, successfully employed, and we have no doubt there are many instances where every object may be gained, and a saving of a great part of the expense effected, by a judicious limitation of the general plan laid down. In the same way the subsoil-plough has, we are inclined to think, been in frequent instances too indiscriminately applied, and an equal or better effect, it is presumed, would be produced on many soils at much less expense by a thorough application of the common plough with additional strength, so as to bring at once to the surface a substance which, being amalgamated with an impoverished or weak soil, would wonderfully assist its

fertility. We would not be thought to wish in any way to detract from Mr. Smith's invaluable discoveries by these observations, for his great merits are not to be lessened by the misapplication of his principles; and if it be the duty of the state to reward those who have accomplished, by their genius, great public improvements, we know no individual who deserves so well of his country.

Manures.—At the beginning of this era scarcely an instance was known of the application of foreign manures in Scotland; or, if known, such instances were merely regarded as subjects of curious experiment. Within the last ten years, however, these have been gradually gaining greater favour, and are now, to the great benefit of agriculture, extensively applied. Bone-dust, particularly, has given opportunity to the culture of a great additional breadth of turnips; and, by permitting the application of a larger supply of the manure of the farm to the lands nearer the homestead, has still more improved the quality of this fundamental crop. It is almost unnecessary to say that there is scarcely such a thing known in Scotland as broad-cast turnips; and the facility which bone-manure affords to the expeditious completion of the drills is not one of the least of its advantages on a turnip-farm, where the labour is necessarily hurried at so important a season as turnip-seed time. Hitherto it has been nearly to this crop alone that bone-dust has been applied; and the quantity generally found sufficient for a full crop, on light sandy soils or gravel—to which this manure is given with great success—is 16 bushels per English acre.

Rape-dust has not been found so generally to suit the soils of Scotland as a manure, and its greater expense has also tended to limit its application in any degree equal to that of bone-dust. In those lands where the latter has not been found productive of the expected advantage—generally greasy soils—the former has sometimes proved of considerable efficiency in raising green crops; and, in some cases, a mixture of the two, in nearly equal proportions, has been found to suit where either, separately, had proved comparatively ineffectual. The crop to which rape-dust, however, is generally applied is wheat, and the quantity given is from 12 to 14 cwt. per English acre.

It is considered again unnecessary to go over the usual rotations, as those stated as having become prevalent during the last period characterises equally the present general practice in this respect. The great improvement which has taken place of late years in the mode of cropping is distinguished rather by a desire to be guided by the application of a sound discrimination than by following any fixed rule. It is no doubt still held bad practice to take two corn-crops in immediate succession, and only to be justified by the application of a large addition of manure; but the kind of crop

to be grown, under the particular circumstances of the state of the season or soil, can only be successfully regulated by judicious observation, and such corrections applied in the form of altered management as reason and experience may dictate. It is thus that barley or oats is frequently substituted for wheat, beans for turnips, when the latter have, in the previous rotations, proved perhaps unsuccessful; and it is owing to the operation of such principles that pease have been justly expelled from the course in Scotland, where good farming prevails.

Live-Stock.—It is almost unnecessary to allude further to the great extension and improvement in live-stock. Improved short-horned cattle are now to be found, in greater or less perfection, in all the lowland districts of Scotland, while in the middle and south-eastern counties they are to be frequently met with of equal symmetry and weight to many of the herds in the southern part of the empire. But it is chiefly in its extensive flocks of Leicester sheep that Scotland may now successfully vie with her southern neighbours. This excellent breed has now entire possession of all the arable districts in the south-east of Scotland, while it is rapidly being extended along the whole lowlands of the eastern coast; and indeed there is now no arable district, throughout the country, where they are not known to a greater or less extent. That in these circumstances there are not in Scotland, in greater numbers, such men as the Bakewells and Culleys of former days, is owing, perhaps, to so many possessing an equal degree of eminence for these improved breeds of live-stock; but it would be unjust not to mention the well-known celebrity of Captain Barclay Allardice, of Ury, and Mr. Watson of Keilor, who, in the "far North," have produced a breed of stock which has successfully competed with the best of England.

Nor must we omit to mention the great success which has resulted from the extensive introduction of the Cheviot breed of sheep into the Highlands of Scotland, which has now so rapidly increased, that it is computed upwards of 100,000 sheep, and 100,000 stones of wool are annually disposed of at Inverness fair, the great proportion of them Cheviots; and from Sutherland alone it is estimated that 40,000 of this breed and 180,000 fleeces are annually sent to the south;* and all this has been effected without materially, it is supposed, having diminished the value of the export of black cattle from the Highlands. It should also be stated that Scotland, besides supplying herself with a sufficiency of excellent farm-horses to meet her extended cultivation, continues to export a few to the neighbouring part of the

* Anderson's Highlands.

kingdom, from the western counties. In most arable farms one or two horses are bred with a view to maintain the strength of the farm, but seldom is the success equal to this object entirely, and recourse is had to the pastoral districts to assist this deficiency. Perhaps there is no part of economical management to which the agriculturists of Scotland are less attentive than to the ordinary maintenance of the farm-horse; and although some improvement has taken place of late years, with a view to save the great consumption of corn which there so generally obtains—by substituting chopped hay, straw, and steamed food of a more economical kind—an extension of this practice is much required, and ought to form a matter for encouragement.

Implements.—The correct application of mechanical principles to the improvement of agricultural implements, which has been eminently encouraged by the Highland Society, has been very conspicuous of late years, and nearly every operation in husbandry has been brought to display the effects of a more efficient adaptation of these principles. Further economy of labour has been obtained by greater attention to the right adjustment of the force of traction; and a general neatness and precision, through the introduction of better implements, now characterize the detail of many operations which were wont to be very imperfectly performed. It cannot be expected that we should particularize these, but it may be right to state that the very general application of steam on large farms to the threshing-machine has given rise to the introduction of more powerful and increased machinery, which has very materially increased and perfected its efficiency, and rendered its services more than ever appreciated. We wish we could see a reaping-machine brought to equal perfection, for, as it is, no implement of this description has been produced which gives promise of soon meeting general regard. It may be mentioned that the greater part of the crop in Scotland is cut with the teethed sickle, or single-handed scythe-hook, and though in many instances different descriptions of double-handed scythes are in use, and have of late been further introduced, these do not appear to execute their work so well as to justify the general resort to a mode of cutting which is only less expensive as regards wages.

The progre. s of the subsoil plough is steadily advancing, and this implement is to be found still, however partially, in exercise in almost every district of Scotland, so that the instances of the beneficial effects of its use are sufficiently spread to insure—with the additional incentive supplied by the premiums of Agricultural Societies—the rapid extension of so effectual a mode of improving thin soils. But, in the mean time, a great deal has been done by the more general practice of substantial and deep ploughing, to

which the introduction of the subsoil plough has mainly contributed. The ordinary operation of ploughing has been of late years infinitely improved, and great additional fertility imparted to the soil by raising liberally a fresh substance to the surface. This has been accomplished, in most instances, by the application of three or four horses to the common plough in executing the winter furrow, and even with the ordinary power of two horses, much more substantial work is performed, so that a depth of from 10 to 12 inches is in this way frequently obtained.

Produce.—With respect to the effects of all these improvements upon productiveness, we have already alluded to the general results in a comparison with rents; and there are so many circumstances which go to affect particular crops, besides the condition of the soil, that it is in vain to attempt to give a precise statement of the actual increase upon a given species of crop induced by improved fertility. We know, however, that this increase cannot fail to be very considerable, other matters being equal, and we have no doubt, in a comparison of the amount of grain produced upon an inferior description of land, managed after the general fashion of the present day, would be double what it was under the ordinary management of the beginning of this period. On the finer descriptions of lands of course this increase is very much less, and in some cases scarcely perceptible. Thus the average of good land may be now assumed giving this result:—

Wheat	30 to 32	Bushels for	English	statute acre.
Barley	40 to 44	,,	,,	,,
Oats	46 to 50	,,	,,	,,

The average produce of the lighter lands, where draining has not been much required, may be stated as now—

Wheat	22 to 26	bushels	per acre.
Barley	34 to 38	,,	,,
Oats	36 to 43	,,	,,

But it is in the thin damp soils now drained that the great additional increase has been obtained, and whereas they were formerly unproductive and precarious under every crop, they may safely be held as yielding now a greater return of wheat than the last description of soil alluded to, and fully an equal produce of oats and barley.

But besides this greater productiveness in ordinary seasons, there is every reason to believe that recent improvements have been highly instrumental in resisting the influence of late and unfavourable weather; and it consists with our experience that some locali-

ties in Scotland have, from the effects of draining and shelter, and these not very perfect, acquired an earlier maturity of at least ten days in average years.*

The reproductive powers of the improved system of agriculture, in comparison with that effected by the method of treatment pursued at the beginning of this inquiry, is no less conspicuous, and is also worthy of notice. Take, for example, the case of a farm of 100 acres, after the fashion of 1784, under its rotation of 1st, fallow; 2nd, wheat; 3d, barley; 4th, oats; 5th, pease; and similar land, now under a system of 1st, turnips; 2nd, barley or wheat; 3d, clover (hay); 4th, pasture; 5th, oats; and estimating the weight of straw of the crops of both periods alike at 3 cwt. per qr., according to the estimated produce stated above, we appear to be justified in adopting the following result:—

			Tons.
Crop of 1784	80 acres grain, 4 qrs. per acre 320 qrs. at 3 cwt. per qr.		48
		Tons.	
Crop of 1837	40 acres grain, $5\frac{1}{2}$ qrs. per acre 220 qrs. at 3 cwt. per qr.	33	
	20 acres hay, 30 cwt. per acre	30	
	20 do. turnips, 20 tons, do.	400	
			463
Difference in materials for manure			415

Thus, without taking into account the greatly less quantity of straw disposable for dung in the former case, from the want of other fodder, we have an increase of reproductive materials equal to nearly ten times the amount of the first period.

In estimating the total quantity and value of agricultural produce in Scotland, Mr. M'Culloch,† in his Statistical Account of the British Empire, gives a sketch of the "distribution of land" at the present time, compared with that afforded by the General Report of Scotland (published in 1814), and thus states the matter:—

"This is a subject as to which the real information at our command is as limited, in respect of Scotland, as of the other divisions of the empire. According to the statistical tables in the General Report of Scotland, the arable land is estimated at 5,043,450 English acres. Of these the proportion in grass is estimated at 2,489,725, leaving 2,553,725 in tillage, which is supposed to be distributed as follows:—

* See p. 34. † Vol. i. p. 537.

	Acres.
Wheat	140,095
Barley	280,193
Oats	1,260,352
Rye	500
Beans and Pease	118,000
Potatoes	80,000
Turnips	407,125
Flax	16,500
Gardens	32,000
Fallow	218,950

"But a large extent of waste land has been brought under cultivation during the last twenty years ; and we are also satisfied, from the greatly increased consumption of wheaten bread in Scotland, and other circumstances, that the quantity of land assigned to the growth of wheat has increased both absolutely and relatively. In our view of the matter, the distribution of the land in tillage would be more correct, were it made as follows :—

	Acres.
Wheat	220,000
Barley	280,000
Oats	1,275,000
Beans and Pease	100,000
Potatoes	130,000
Turnips	350,000
Flax	15,000
Gardens	32,000
Fallow	150,000
Total	2,533,000"

Now, it humbly appears to us that besides that, in this distribution of the land in tillage, "the large extent of waste land brought under cultivation during the last twenty years" has been omitted to be added, the distribution itself—allowing that it was relatively correct in the first instance—has not been sufficiently changed to meet the altered circumstances. The breadth of turnips, especially, has been diminished, in place of being materially increased. But it is difficult to understand upon what principle these statements have been framed, as, in order to agree with any known mode of culture, the grass being excluded, it is necessary that the fallow and green crops stand in proportion to the corn crops as one to two, unless, indeed, we suppose a repetition of white crops, which cannot now surely be contemplated. Taking, then, the total number of arable acres as here mentioned, we should be inclined to adopt the following distribution as nearer the truth :—

	Acres.
Wheat	330,000
Barley	410,000
Oats	940,000
Turnips	420,000
Fallow	170,000
Potatoes	140,000
Beans and Pease	100,000
Flax	10,000
Gardens	33,000
Total	2,553,000

Again, it may serve to afford some idea of the extraordinary increase and improvement of live-stock in Scotland throughout the whole period of this survey, and the extent to which the feeding process has been carried, to state that, while in Glasgow, in 1763 —though that city had then a population of 30,000—the slaughter of cattle for the supply of the public market was wholly unknown, the number of sheep and oxen there required now does not materially differ, in proportion to the greatly increased number of its inhabitants, from that furnished to the city of London.* In the other large towns of Scotland, there is reason to believe, a demand in nearly a similar ratio exists. Such has been the extraordinary improvement in the condition and habits of the people! The whole of this supply of butchers' meat is now furnished to Scotland by her own agriculture; and, besides the large exportation of lean stock to the neighbouring kingdom, a very considerable number of fatted animals are continually being sent thither from the north, east, and south of Scotland,—an amount which has been lately much increased, from the greater facilities afforded by steam-navigation.

It now remains that we endeavour to confirm, as has been required, the above account of the extensive and rapid progress which has distinguished the agriculture of Scotland during the last sixty years, by a reference to the "description of improvements which can be proved to have taken place in a specified district."

The tract of country selected for this purpose is that situated in the eastern part of Roxburghshire, extending along the banks of

* "In 1831 the population of London amounted to 1,472,000, and, at an average of three years ending with that time, 156,000 head of cattle, and 1,238,000 head of sheep, were annually sold in Smithfield market."—*M'Culloch's Statistical Account*, p. 586.

the Tweed and the Teviot for about ten miles at and adjoining the confluence of these rivers, having the town of Kelso for its centre, and embraces the parishes of Ednam, Sprouston, Linton, Kelso, Makerstom, Roxburgh, and Eckford. Besides that the writer is, from residence, and intimacy with the great majority of the tenantry, and from possessing in the heart of it a farm of nearly 1000 acres, peculiarly conversant with this district, it is from its perfection in agriculture, as well as from its varied surface and variety of soil, specially appropriate for such an illustration. In the first respect, indeed, it will not be considered, by those who are familiar with the mode of culture and appearance of this part of the country, that we say too much when we affirm that, in the skill and efficiency of its husbandry, and in the fertility of its fields, it is surpassed by no district of the same extent in Scotland. Its whole area extends to upwards of 42,000 acres, the arable part being, with very few exceptions, subdivided into enclosures of from 20 to 40 acres, with substantial and thriving thorn-hedges, in some instances picturesquely ornamented with hedge-row trees. The general character of the soil is a free loam of various depth, composed of a rich sand or gravel upon an open subsoil, the surface being more aluminous in its nature as it partakes of the level of the rivers; the land lying upon the elevated slopes, apart from the rivers, is of a more cohesive nature, imparted chiefly by its resting upon a close retentive bottom. Again, as the country rises to the highest ridges, the soil is generally thin and of a vegetable or peaty substance, frequently incumbent upon a close and nearly impenetrable condensed sand and yellow clay, strongly impregnated with oxide of iron. A very general mode of culture is prevalent throughout the entire district, the leading characteristic being that of a rotation of five years. The far greater proportion of the soil being well adapted for the successful cultivation of turnips, that crop commonly forms the foundation of the course pursued; and perhaps there is no part of the island where the preparation of the soil for the raising of this valuable esculent is better understood, and where its cultivation is carried on with so much attention to cleanness and order. The drill system is universally prevalent. The drills range in extent from 26 to 30 inches, the medium of 28 inches being that generally adopted, the dung (previously well fermented and prepared by turning, or bone dust, as the case may be) being applied in the drill, with few exceptions, immediately before sowing. From the great breadth occupied by this crop, on many farms, the operation of sowing is frequently not concluded until the early part of July, and, in the majority of seasons, turnips sown, even at this late period, prove a valuable crop for spring food; but, in general, the best season for

sowing is considered to be, for Swedish turnips, during the last week of May, and, for the varieties of the white species, from the beginning until the middle of June. A half or three-fourths of this crop, upon the drier lands, are eaten upon the ground by sheep, the remainder being generally what is technically called *stripped* and carted home for soiling. The land is now ploughed as cleared; that part where the crop is early consumed being often followed by wheat, while the later-cleared ground, and by far the larger proportion of the whole, is reserved for barley. These crops are also not unfrequently drilled or ribbed, and the lands, being now sown down with grass-seeds, are depastured the two following years, a proportion, equal, perhaps, to a sixth of the whole, being the first year cut for hay. Oats are almost the invariable crop which follows, when the pasture-lands are again subjected to the plough, although, upon some fine haugh or water-side land, wheat has been occasionally grown at this stage of the course with some success.

This concludes the rotation—turnips again following; and no manure of any kind is applied to the intermediate corn-crops, even when it has been thought advisable to take a wheat-crop in the last of the course.

The above is given as the general mode of management throughout the district, but, as may be supposed, there are many exceptions to the uniform practice of this course; although there is little doubt that, for a period of any considerable extent, where there is no access to an extra supply of manure, the grazing for two years will be found to prove ultimately the most profitable system of occupation on those soils not of the best descriptions. On much of the lands of a first-rate quality, or of a stronger nature, a four-shift rotation is pursued, while a plain fallow is sometimes adopted on the latter description of soils, in the room of a turnip-crop.

This mode of management now extends over nearly 35,000 acres of this district, about 2000 acres of the remainder of the whole being occupied in woods and plantations, and a little above 5000, chiefly on the higher lands, as sheep-pasture.*

The extent annually in corn is thus about 14,500 acres, 13,300 in artificial grasses, and upwards of 7000 in turnips, potatoes, and fallow, in the following proportion:—

* New Statistical Accounts of Scotland, Nos. V. and XIV. For additional valuable information of this kind, the writer has been much assisted by the Report of the sub-committee (of which he formed one) of the Border Association for the encouragement of agriculture in reference to the Berwick and Kelso railway. Kelso, 1836.

Turnips	. . .	6000
Fallow	. . .	700
Potatoes, &c.	. . .	550

In the latter part of the last century, previous to 1795 at least, a great part of this fine district was unenclosed, and excepting the better description of land upon the immediate vicinity of the rivers, exhibited the dominion of the plough, in irregular and detached patches, selected according as the prejudice or discrimination of the occupier dictated, the intermediate portions being very generally devoted to grazing cattle, which were put under the charge of a herd to prevent their trespassing upon the divisions set apart for corn.

The meagre and imperfect statistical information of the period, as regards agriculture, affords no complete account of the proportion of land under cultivation in this district at that time; but there is every reason to believe, from the information we have been able to find, that in 1790 it did not amount to one-half of the whole extent. For instance, in the parish celebrated as that in which Mr. Dawson had early introduced and so extensively practised the turnip-culture, no greater progress had been made at that time than to the extent of two-thirds of the present arable land, or to less than a half of the whole area of the parish; and since a very imperfect mode of a six-shift rotation then generally prevailed, as the most favourable in the district, of fallow and turnips, wheat, pease, barley, clover, and oats; and we are assured that not even in this favoured spot did the breadth of turnips amount to more than a half of the whole fallow break, a tolerably correct estimate may be afforded of the distribution of the crop at that time. And, in now giving a comparative view of the two periods, we have, in the first, been guided by a reference to the average systems pursued, and other sources of information,* rather than confined ourselves to the data alone afforded by the rotation above quoted.

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* The distribution of the corn-crops in the whole county is thus given in the survey by Dr. Douglas in reference to 1784-6:—

Oats . . .	50,030	Wheat . . .	5,741
Barley . . .	14,763	Pease . . .	8,203

And the proportions are thus varied for 1796:—

Oats . . .	41,008	Wheat . . .	9,842
Barley . . .	16,404	Pease . . .	6,562

'General View of the Agriculture of Roxburghshire,' p. 79. By the Rev. R. Douglas, D.D., Galashiels. Edin., 1798.

1784-94.	Acres.	1837.	Acres.
Oats	7,820	Oats	7,044
Barley	3,260	Barley	4,624
Wheat	1,440	Wheat	2,820*
Pease	1,480	Clover and pasture... including 2,600 hay.	13,249
Clover	3,500	Turnips	6,000
Fallow	1,750	Fallow	700
Turnips, &c.	1,750	Potatoes and beans .	544
	21,000		34,981

But from the system of repeated corn-crops, which distinguished the former period, the near approach of the *extent* of surface in corn does not seem to exhibit so great a disproportion, at first sight, as might have been apprehended; and it is only when an estimate of the *value* of the produce of the two periods is exhibited that a just conclusion is arrived at, thus:—

Acres.	1784-94.	£.
7,820	Oats, 30 bushels per acre, at 3*s*....	35,190
3,260	Barley, 26 „ „ 4*s*....	16,952
1,440	Wheat, 18 „ „ 6*s*....	7,776
1,480	Pease, 10 „ „ 5*s*....	3,700
3,500	Clover .... at 4*l*. per acre	14,000
1,750	Turnips, &c. .... 4*l*. „	7,000
		£84,618

Acres.	1837.	£.
7,044	Oats, 40 bushels per acre, at 3*s*....	42,264
4,624	Barley, 36 „ „ 4*s*....	33,292
2,820	Wheat, 24 „ „ 6*s*....	20,302
2,600	Clover ..... at 6*l*. per acre	15,600
10,695	Pasture ...... 2*l*. 10*s*. „	26,622
6,000	Turnips ...... 5*l*. „	30,000
544	Potatoes, &c... 8*l*. „	4,352
		£172,432 †

* The *average* proportions in wheat and barley have here been assumed, rather than that of this particular time, for, from the comparatively low price of wheat subsequent to 1835, much less of that grain than usual had been sown for a year or two at that time. This is now again assuming its natural level.

† This estimate, we are aware, produces a very considerably higher result than would be exhibited by adding together the estimates of the produce of the separate parishes as given in the New Statistical Account, but these bear some marks of incorrectness—arising probably from some misapprehension in not distinguishing, in the returns to the clergymen, the *disposable* from the *gross* produce—which, it was thought, rendered the above necessary, and to be preferred.

It is thus in the great additional extent of turnips, and improved pasturage, that the extensively-increased productiveness of the modern system eminently consists. Accordingly it is in the article of live-stock that the wonderful change is chiefly remarkable. There is here the same difficulty in obtaining a correct amount of the number of live-stock maintained within the district at the early period of this comparative view : nor is it, there is reason to think, in increase of numbers, so much as in weight or quality, that the great difference would appear, had we right data to form a complete estimate. In the first epoch the Cheviot breed of sheep prevailed throughout the entire district, saving, perhaps, a few of the cross of the indigenous breed already alluded to, kept upon improved lands; and it appears, from Dr. Douglas's Survey,* that even in 1796 there were no more than " five or six small flocks of the Dishley breed kept by gentlemen in rich enclosures, and by one or two farmers in the arable district." Now, the whole of the district under review, excepting a very inconsiderable portion in the highest ridges of one of the parishes, is possessed by this excellent breed of sheep; and the pains and expense bestowed of late years in their culture and improvement have justly established a character for this part of the country for its breed of Leicesters, which is surpassed by that of no other district in Scotland; and it is not, perhaps, saying too much to add, that, in this respect, it would successfully vie with many of the highest note in the southern parts of the kingdom.

It may be right to give a sketch of the mode of management and disposal of this stock, here so celebrated. On nearly all farms of any considerable extent what is called a breeding-stock of these sheep is kept, and the system pursued is generally the following. From the ewes three successions of lambs are taken, the dams being sold off at the close of their third breeding-season, or when four and a half years old. In general, the whole produce of these ewes is retained upon the farm on which they are bred, a proportion of the ewe-lambs, when gimmers, coming in to take the place of the old ewes sold in each year. The wedder-lambs, again, are disposed of as fat, many of them immediately after being deprived of the first fleece, and the remainder after being fed on turnips, in the winter or spring of the second year. Not unfrequently, however, upon such farms where a large proportion of turnips cannot be raised, the whole wedder-lambs, and sometimes part of the ewe-lambs, are disposed of at weaning-time; and those ewe-lambs kept beyond the number required to maintain the complement of the year are sold when gimmers, generally at about eighteen months old. These young sheep, being thus so early matured for the

* General View, p. 167.

butcher, are maintained from their earliest time on full feed, it being a great object to prevent them losing any of the condition they generally possess when taken from the ewes. With this view, also, they are early put upon turnips, as it is very desirable they should be well acquainted with this their essential means of support, previous to any failure in the nutritious properties of the grass, or the occurrence of severe weather. When either of these events takes place, the turnip forms the chief or only source of their subsistence.

To the young stock intended to be kept for breeding fewer turnips are commonly allowed, although they are seldom, during any part of the winter, entirely deprived of this useful assistance. The ewes, having at this season the range of the whole pastures, are only allowed auxiliary food during the severity of a storm and in hard winter weather, until towards the approach of the period of lambing, when a proportion of turnips becomes indispensable to maintain them in sufficient condition to bring them well through this critical and interesting season. In general more sheep are fattened than are bred in the district.

The cattle stock of the district may be said properly to consist of the short-horned, or Teeswater breed; at least, great pains are taken to obtain that admired breed in as pure and improved a state as it can possibly be produced; and it must be admitted that, in not a few hands within the bounds included in this review, are to be found some of the finest specimens of short-horns of which Scotland can boast. The liberality and exertions of the Border Union Agricultural Society, whose annual exhibitions are held alternately at Kelso and Coldstream, have undoubtedly contributed largely to effect this end by cherishing and exciting a spirit of praiseworthy rivalry in this important branch of rural economy, which has been productive of universal benefit. The premiums paid by that Society, for bulls and Leicester sheep, annually, amount to upwards of 150*l.*; and by this liberality the Society has succeeded in bringing forward a display of these animals which, it is confidently presumed, is not equalled at any similar exhibition in this part of the island.

Although not entirely a breeding district for cattle, a considerable number are reared within its bounds, it being pretty generally the custom that a few calves are raised, perhaps, upon an average, about two to the hundred acres. These are grazed and retained upon the farm until fed off, commonly at three years' old, although, by forcing, or being kept on the best food from their earliest age, they are not unfrequently prepared for the butcher at the conclusion of their second year; and it is not uncommon to see animals of this age produced at the Kelso spring market of sixty stones' weight. Besides, additional cattle are bought in lean

for feeding; and the number fully fatted and annually sold, almost entirely for the English markets, cannot be estimated at fewer than 1000, at an average weight of 55 stones each. The feeding of cattle was not entirely unknown in this district in the early epoch of this survey,* but it may be fairly assumed the quantity did not at that time reach to a fifth part of that just mentioned.

Estimating from the very limited information to be gathered from the statistical accounts of the parishes comprehended in this district,† it would appear, in numbers, that the quantity of sheep maintained at the two periods, respectively, is as about three to four; while the weight in the present time cannot be taken at much less than double that of the former period. Exclusive of a considerable number of sheep that are brought into the district to be fed on turnips during the winter months, the number of Leicesters we think we may assume, from personal knowledge and such information as we have access to, to be maintained now throughout the year, cannot be less than 25,600. Of these somewhat more than the half, or 14,500, are disposed of annually; and the quantity of wool produced has been estimated at upwards of 5100 stone.

Under the former system we may conclude that not quite 20,000 smaller sheep were maintained; and, allowing for a proportion being of a better description, it may fairly be estimated there would not be greatly above a third sold in each year, or say 7000, of such comparative weight, as to cause the produce in mutton certainly not to be fairly considered more than a fourth part of the result of the yield of the present time. In wool the deficiency would thus be equal to a half.

Rental.—The information contained in the statistical accounts of the two periods does not afford materials to enable a comparative view of the rents of the whole district to be given; for while, in the records of some of the parishes, we have the rental of one period shown, it is withheld in the account of the next. In one parish only we have the difference in the two periods distinctly stated; and this exhibits a contrast which we have no doubt may be taken as a fair criterion of the whole. In 1791, the real rent of the parish of Eckford is stated as having been 3699*l.*, while at the present time it is 8676*l.*‡ In corroboration of the view that these figures afford data for a tolerably fair estimate of the increase of the rental of the district, it may be mentioned that one of the finest farms within its compass, on the opposite extremity to the

* Wight's Survey, vol. ii. p. 259.
† Statistical Account of Scotland, vols. iii. and xix.—Linton and Roxburgh.
‡ New Statistical Account of Scotland, No. XIV., p. 230.—Roxburghshire.

parish just alluded to, which in the first period was let for 1200*l.*, was the other day taken on a lease at 2650*l.*, and had been previously rented at upwards of 2700*l.*

The sale of some estates within the district, at this time, also exhibit the greatly improved value of land at the different periods. The fine estate of Ednam, which sold in 1787 for 31,500*l.*, was purchased by Lord Dudley and Ward, in 1825, at 105,000*l.* A small property in the neighbourhood of Kelso, which was disposed of, a few years subsequent to 1780, at 7500*l.*, brought last year 22,500*l.*; and without enumerating further, these instances may be held as affording a fair example of the effects of improved culture in raising the value of land in this quarter, as well as throughout the other districts of Scotland, over which the plough has been so efficiently extended.

General Improvements.—Lime continues to be very liberally applied to all the soils of this district, and although this valuable stimulant is not to be obtained nearer than at an average distance of twenty miles, it is believed there are very few acres subjected to tillage within its whole limits which have not once, at least, within the last forty years, been brought under its influence. But the chief improvements which have of late done so much for this part of the country (and it is conceived enough that it should be now mentioned) have been effected by a more extensive system of draining, and the free use of bone manure. From the tendency that the prevailing practice has to induce a general system, a considerable breadth of land, for many years past, has been applied to the growth of turnips in a very unsuitable state for this crop; and consequently there is not now so great an addition to the extent of ground thus occupied, as that the soil being rendered suitable by draining, the quality of the crop is so very materially improved. Nevertheless, something also has been effected in extent; perhaps to the lessening of a plain fallow by about a third of the ground thus occupied ten years ago. But it is in the increased weight since this time that so much has been accomplished; and although the frequency of the drains is still far from being sufficient, in almost every instance, still enough has been done to show that there is not an acre of land in the district which may not be rendered suitable for turnips; and moreover that these damp lands, when effectually drained, are, for some time at least, (the limit of which has yet to be proved,) eminently calculated to produce a large, vigorous, and healthy crop. The writer has himself effected a considerable improvement in this way, by which he has, with advantage, substituted turnips on his fallow break to double their former proportion; and has even in this wet season nearly fifty acres, a very full crop upon land never before subjected to this system. His draining opera-

tions however, he must acknowledge, as compared with the present practice, have been very far from perfect; and from the now limited term of his lease, he has not considered himself further warranted to incur the large outlay, which the adoption of the more perfect system recently introduced would necessarily involve. But he can refer with confidence to the complete success of such improvements to his spirited and intelligent immediate neighbour, Mr. Roberson of Ladyrig, who has lately renewed his occupation upon an improving lease of twenty-one years, and who by the adoption of Mr. Smith's system of drainage is fast proceeding altogether to change the character of the greater part of his farm. In reference to the soil thus alluded to, and occupied by the writer, it may be mentioned that in the Statistical Account of the Parish of Kelso* (1794) it is stated, as descriptive of this land, "that it is in general thin and wet, and the bottom is a red clay: here the crops are generally three weeks later than in the vicinity of the rivers." That such is a correct account of matters at this period we have little doubt, as the effects of the writer's partial improvements since 1824 have been such as to produce an earlier maturity to the extent of at least ten days; and it may be confidently asserted there is now little palpable difference between the harvesting of the crops here, and those of the land along the river sides.

The more extensive application of bone-dust has also assisted eminently in improving the quality of the turnip crops, and thus tending to the general increased fertility of the soil. In place of, as formerly, drawing out the farm-yard dung so as to extend over the whole fallow break,—by which practice no part was sufficiently manured, and a secondary crop the result—the application of bone-dust to a portion admits of a concentration upon the nearer lands of the heavier material in sufficient quantity, so that the farmer is enabled to act upon the golden maxim of good husbandry, "never to sow a crop where there is not condition in the soil to grow it luxuriantly." The consequence is that in place of the turnips being worth 3*l.* an acre, they are now more frequently worth 6*l.*; and of this benefit all the after crops partake in relative proportion.

In conclusion, we cannot resist the opportunity of again adverting to the duty which is, at this crisis, specially incumbent upon the proprietors of the soil to come liberally forward, mutually to co-operate with the tenantry in promoting the extension of those improvements which have been proved to be so eminently calculated to advance the prosperity of the country.

At no period in the history of agriculture have the benefits derived from a given species of amelioration been so obviously conspicuous, nor the expense in proportion to the result so capable of

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* Sir John Sinclair's, vol. x.

a precise estimate, as that which is exhibited by the "frequent drain system." It, however, involves an outlay which few tenants have the means perfectly to accomplish, and, even if within their reach, it is not an improvement of such a nature as, it is feared, will be efficiently performed by a possessor upon a limited tenure; and hence, besides that discredit, from partial failure, owing to incomplete work, attaches to the principle, the operator is deprived of the full benefit of the melioration. As detailed by its ingenious author, it is a permanent improvement, and, as such, should be performed at the expense and under the express superintendence of the proprietor. It has been proved eminently calculated to raise the value of the land, and thus its tendency is to increase the revenue of the proprietor; and as there is no judicious tenant who will refuse to pay a full per centage for such an expenditure, immediately upon its being applied, there is at no time any sacrifice required, while the ultimate result cannot be questioned. We earnestly, then, impress upon landlords to give this scheme due consideration, as that by which they shall best promote their own interest; and by strenuously acting to advance the more rapid extension of a system calculated in so high a degree to increase the fertility of the soil, enable our agriculture to keep pace* with the enlarged demands of a prosperous and increasing people.

A Practical Farmer.

October, 1838.

* The estimated number of acres annually in wheat throughout the United Kingdom being 4,830,000, an increase to the produce of half a quarter per acre would suffice for upwards of two months' consumption of this grain.

X.—*On pure and improved Varieties of Wheat lately introduced into England.*—An Essay, to which the Prize of Twenty Sovereigns was awarded in July, 1839.—By Colonel Le Couteur.

White Downy.

1st. *The mode of procuring the sorts of wheat described.*— One of the best varieties of wheat in general cultivation, from which I have raised large crops, is the " White Downy," or hoary—the " Véloute " of the French—described in my work on Wheat.

This excellent variety is believed to be the same that is so well described by Boys, in his ' General View of the Agriculture of Kent,' as the " Hoary White," or " Velvet-eared ;" said by him to have been much prized by the millers, but then entirely lost.

2nd. *Its culture,—viz., preparation and quantity of the seed ; time and method of sowing ; relation both as to preceding and following crops, and as to varieties of soil.*—The seed was carefully washed in several waters, till the water appeared clear on stirring the wheat with it : this is intended to draw off any smut, rust, or noxious invisible seed of the fungus tribe, which might be adhering to it, previous to steeping it in brine, made sufficiently strong to float a potato or an egg. In this it was steeped a night, or about twelve hours ; then well mixed with powdered lime. This process, it is thought, ensures the destruction of the eggs or larvæ of any invisible insect adhering to the seed.

Time and method of sowing.—The seed thus prepared was sown in drills, on the 29th of January, 1836, 7 inches apart, with an ordinary wheat drilling-machine, at the rate of 2 bushels, or a little more, to the acre. The wheat was carefully hand-hoed in the month of May, which caused it to tiller freely.

Relation both as to preceding and following crops.—The land in which the above wheat was sown had been well dressed with 9 loads of dung to the acre, the previous year, for potatoes, which were twice horse-hoed, and once hand-hoed, to remove any weeds that the horse-hoe might have left. The land remained very clean ; and after the potatoes were dug, and well cleared from the soil by 2 ploughings, 36 quarters of sea-weed (or kelp) ashes were spread on the field, or 9 quarters to the acre, at a cost of 2*l.* 5*s.* per acre, and, a month afterwards, ploughed in, about 5 inches in depth, with a view to nourish and warm the young shoots of the wheat, sown 3 inches deep. The ashes have a peculiar tendency to cause the wheat to grain, and render it plump, white, thin-skinned, and farinaceous. They have the additional quality of greatly augmenting the produce of the suc-

ceeding crop of clover. The soil on which the trial was made, being derived from argillaceous schistus, is light and rich, indicating, however, the presence of iron; to counteract the effect of which lime has been applied.

3rd. *Hardihood and power to withstand severe winters.*—This wheat will withstand the most severe weather. The season 1837 to 1838 was a very trying one, both as to wetness and severity of cold, the thermometer having fallen to 18° below freezing; but the crops of this wheat raised by my neighbours were perfectly insensible to it, and of great produce.

4th. *Early maturity and time of severance of crop.*—This wheat is not remarkable for its early maturity, though it cannot be called a tardy variety. On this occasion it was reaped about the 16th of August.

5th. *Tendency to degenerate, and liabilities to disease.*—From my own experience, and from that of the oldest persons I have consulted on the subject, this excellent wheat is not subject to degenerate; and, by bestowing on the portion of it intended for seed the attention recommended in my work, and annually, or even occasionally, varying the manure intended for it, it is possible that it may never degenerate.

The only objection to it is in the huskiness, or velvetty ear, which in damp weather is retentive of moisture; and in snatchy seasons the grain is more apt to sprout than the smooth-chaffed varieties. It is not much affected with dust-brand; and, when pickled and limed as described above, has never been found with smut-balls. It is little liable to shed, even when over-ripe, and will resist very heavy gales without being laid or broken. In the wet and stormy season, which prevailed in the Isle of Man before last harvest, this was the sort which resisted it best. Its height is from 4 to 5 feet, according to the soil.

6th. *Amount of produce in grain, chaff, and straw: and the relative quantities of flour and offal.*—This crop produced 48 imperial bushels to the acre, of a very fine sample. It weighed 62 lbs. the imperial bushel. The straw was firm and white; the weight of it produced was 4557 lbs., and that of the chaff 315 lbs. to the acre.

Quantity of flour and offal.—The quantity of flour obtained from an acre was 2402 lbs. of the finest, 126 lbs. of pollard, and 416 lbs. of bran.

The bread is of a very fine quality, white, and rather of a

moist nature; 18 lbs. of this flour making 25 lbs. of bread. With a view to further the design of the Agricultural Committee, the mode of making this bread is stated, which may enable other persons to make comparative experiments with similar quantities of flour from their own wheats. The flour was placed to rise, or to sponge, overnight, with ½ a pint of yeast and 2 quarts of water. At 9 o'clock the next morning, 4 ounces of fine salt were added, and it imbibed 3 quarts of water, milk-warm, which was well worked up, drawn up (as it were) into strings to expose it to the air as much as possible, in order to render it light; which is preferable to pressing it down with the closed fist, which more or less excludes the air, and tends to render the bread heavy. The dough is then left in tin pans to rise for 20 minutes or ½ an hour, and is usually baked in 2 hours, more or less, according to the size of the loaf. It is weighed when cold the next morning.

It is to be observed that some flour has only imbibed, on the following morning, after being placed to rise overnight, 2 quarts and 1 pint of water; whereas other sorts have imbibed as much as 3 quarts and 1 pint, or a quart more.

Crop.

	£.	s.	d.	£.	s.	d.
45 bushels, at 8*s*. per bushel . . .	18	0	0			
3 ditto Tailings, at 5*s*.	0	15	0			
Straw, 40¾ cwt., at 1*s*. per cwt. . .	2	0	9			
				20	15	9

Charges.

	£.	s.	d.	£.	s.	d.
Rent of land per acre	5	12	6			
9 quarters of ashes	2	5	0			
Tithe	0	8	6			
One ploughing for crop	0	8	0			
Half-tillage and dressing on potatoes	2	0	0			
Seed, 8*s*. per bushel	0	16	0			
Sowing	0	2	0			
Bush-harrowing and rolling	0	1	0			
One hoeing	0	5	0			
Reaping	0	8	0			
Cartage, stacking, and threshing .	0	15	0			
Interest on capital	0	10	0			
				13	11	0
Profit				£7	4	9

Jersey Dantzic.

1st. *The mode of procuring the sorts of wheat described.*—The seed is described as having been raised from a single ear, origin-

ating from seed procured from Dantzic selected from the finest "High Mixed." It is, however, suspected to be identical with some excellent sorts, called in Sussex, Kent, and some parts of Surrey, the "Chittums," in other parts "Pegglesham;" in Berkshire, "Trump;" in Essex, "Hardcastle;" in some counties, "Old Suffolk;" in Scotland, "Hunter's White;" and assuming several other names.

2nd. *Culture: viz., preparation and quantity of the seed; time and method of sowing, both as to preceding and following crops, and as to varieties of soil.*—The seed was prepared precisely in the same manner as the last described: it was sown on the same day on a contiguous piece of land of the same nature as the last described for the purpose of comparison, therefore prepared and manured in like manner.

3rd. *Hardihood and power to withstand severe winters.*—This wheat is not quite so hardy as the "Hoary;" it is nevertheless considered sufficiently so to succeed throughout the kingdom, excepting the north parts of Scotland. In rich soils it tillers amazingly, and produces a longer straw than the Hoary, nor is it so liable to sprout in a moist climate, from being smooth chaffed: in very severe, moist, and stormy weather, it will be laid sooner than the Hoary.

4th. *Early maturity and time of severance of crops.*—It ripens a week earlier at least than the Hoary, and should be reaped while the grain can be marked by pressure from the thumb-nail, as it is rather liable to shed if over-ripe,—a disadvantage which the Hoary is peculiarly free from, as it is tenacious to the ear.

This was reaped about the 12th of August.

5th. *Tendency to degenerate and liabilities to disease.*—The experience of five years has not found this wheat to degenerate. A sample raised this year, from that procured as above stated, was quite pure and unmixed, it may be said, as only 93 ears of foreign growth were picked from one hundred sheaves, which were carefully examined in order to free the sort from any of stray kinds which might accidentally have got intermixed with it. This is a practice which I now constantly follow with the wheat set apart for seed for the ensuing year.

In a dry season this wheat will afford a beautiful clean, white straw, fit for bonnet-making, or any purpose of thatching: it is firm and tenacious. In wet seasons it is rather subject to

rust, which under such circumstances almost all wheat suffers from.

It is a fact worthy of notice that, in 1837, a field of this wheat, which had been sown with seed carefully washed and steeped in a solution of arsenic,* had not a single smutted ear; but on one head-land, for which there was not sufficient seed, a small portion was fetched from the barn, and sown dry; though appearing a beautiful sample, it was infested with smut throughout; this was of course carefully picked out by hand before it ripened fully, and burned.

6th. *Amount of produce in grain, chaff, and straw, and the relative quantities of flour and offal.*—The crop produced 43½ imperial bushels of 63 lbs.; of chaff 430 lbs.; and of straw, as described, 4681 lbs. to the acre. The quantity of flour obtained from an acre was 2161 lbs., of bran 510 lbs., and of pollards 96 lbs.

The bread from this flour is of a dry light nature, very white and good, but objected to by some from its being quite what is termed dry bread at the end of 48 hours. It is, however, of excellent yield, and, according to the millers, exceedingly fine and smooth in the working. It is a valuable wheat: 18 lbs. of the flour, treated as the former variety, imbibed the following morning 3 quarts and 1 pint of warm water, and produced 25¾ lbs. of bread, weighed when quite cold.

Crop.	£.	*s.*	*d.*
40½ bushels at 8*s.* per bushel . . .	16	4	0
3 ditto Tailings, at 5*s.*	0	15	0
Straw, 41¾ cwt., at 1*s.* per cwt. . .	2	1	9
	19	0	9
Charges as in the last	13	11	0
Profit . . .	£5	9	9

WHITINGTON WHEAT.

1st. *The mode of procuring it.*—From Mr. Whitington himself, a very fine pure sample. The grain is large, full, and plump, rather of a whitish-red cast, and a little thick-skinned.

* The steeping of seed in a solution of arsenic is a dangerous practice, as, from the poisonous nature of the drug, there is a great hazard of accidents occurring. The steeping in brine, as above described by Colonel Le Couteur, is an effectual prevention of smut, and not accompanied with any danger.—SPENCER.

2nd. *Culture; viz., preparation and quantity of seed; time and method of sowing; relation both as to preceding and following crops, and as to varieties of soil.*—The seed was washed, pickled, drained, and limed, as is usual on this farm; then sown in drills 7 inches apart, about 3 bushels to the acre, on the 8th of January, 1838. When the seed is large, it is considered prudent to add half a bushel or more to the acre.

The field had borne potatoes the preceding year, and after two ploughings to free it from any potatoes which might have been left, it was dressed with 2 hogsheads of lime, 6 quarters of lime ashes, and 5 quarters of kelp ashes, at a cost of 2*l.* 5*s.* 6*d.* per acre. This mixture of manures was with a view to afford the wheat a different food from any it might have received, all of them having a tendency to cause the corn to grain, and rather check the overabundant growth of straw. Owing to the cold and frosty season which followed, the wheat was 49 days in coming up; it was hoed in the middle of April, and again in May, which left the land very clean, and the crop continued to look beautiful throughout the season.

It is worthy of remark, that a piece of the wheat was laid along the centre of the field, over which a pipe of liquid manure had been spread from a watering-cart the preceding season on potatoes, just as they were appearing above ground. The crop of potatoes not having absorbed the whole of the nutritive properties of the liquid, the wheat grew taller, coarser, darker, and so abundant in straw, that it afforded less grain, and that too of an inferior sample to the corresponding strips on either side of it. The straw was 7 feet long in many places, and fully 6 feet over the whole field, which consists of a soil derived from argillaceous schistus on a red clay bottom.

3rd. *Hardihood and power to withstand severe winters.*—I consider this to be a very hardy wheat, affording much herbage and straw, very fit for being eaten down by sheep in the spring, when sown early in the fall.

4th. *Early maturity and severance of crop.*—The "Whitington" is rather a late wheat, ripening a week or ten days later than the Jersey Dantzic, before described, though it was in bloom on the same day, on the 2nd of July. It was chopped on the 24th of August.

5th. *Tendency to degenerate, and liabilities to disease.*—From the purity of the seed, and the uniform appearance of the crop, it does not appear likely to degenerate, nor does it seem more liable

to disease than other wheats, but its recent introduction prevents a conclusive opinion being offered on this head. The straw is brittle and many ears break off.

N.B. From the cultivation of another year (1839), I am inclined to think this to be one of the most valuable wheats for poor land: it has not degenerated in the smallest degree.

6th. *Amount of produce in grain, chaff, and straw, and the relative quantities of flour and offal.*—The produce in grain was 33 bushels the acre, a very good sample weighing about 61 lbs. the bushel; the chaff, 483 lbs.; and the straw 7786 lbs. per acre. Here was an amazing produce in straw, which made amends for the deficiency in grain; it is the most productive variety I have met with but one for the straw-yard. The straw is so long that it is unfit for the ordinary purposes of thatching; a short, tenacious, firm straw being generally preferred. The quantity of fine flour obtained from an acre was 1454 lbs., of bran 477 lbs., and 47 lbs. of pollard. The bread from this flour is rather dark, but very well flavoured, and keeps moist some days: 27 lbs. of this flour made into bread, in the mode formerly described, in the same relative proportions of yeast, salt, and water, afforded, when cold $35\frac{1}{2}$ lbs. of excellent bread.

Crop.

	£.	*s.*	*d.*
31 bushels, at 8*s.* per bushel . . .	12	8	0
2 ditto Tailings, at 5*s.*	0	10	0
Straw, $69\frac{1}{2}$ cwt., at 1*s.* the cwt. . .	3	9	6
	16	7	6
Charges to deduct as before, with an extra hoeing, and an additional half-bushel of wheat . . .	14	0	0
Profit . . .	£ 2	7	6

Belle-Vue Talavera.

1st. *The mode of procuring it.*—Described in my work on Wheat as having been raised from a single grain. This admirable variety is invaluable, where it is adapted to the soil and climate.

2nd. *Culture; viz., preparation and quantity of the seed, time and method of sowing, relation both as to preceding and following crops, and as to varieties of soil.*—The seed was prepared precisely as before described. The cultivation of the two fields destined

for this wheat and the Whitington had been similar throughout the course, with the view to ascertain the result on the crop of wheat. This was sown on the 3rd of February, 1838, at the rate of nearly 3 bushels to the acre in drills, on land dressed in the same manner as the contiguous field had been for the Whitington; the land in both may be said to be alike, the best description of light, rich, loamy soil, The seed being large, a greater quantity of it was allowed than usual. It is to be noticed that in another field the seed was put in as late as the 21st February, and that it ripened equally well and early.

3rd. *Hardihood and power to withstand severe winters.*—This wheat has succeeded in the North of Scotland, and is sufficiently hardy to withstand the winter in its grassy state, but it is otherwise more valuable as a spring crop: without doubt it may be sown as late as the first week in February, in all the milder parts of England, with a prospect of reaping quite as good an average crop from it as from any other wheat, but with a certainty of obtaining more flour than from most. A celebrated Scotch agriculturist wrote of it on the 12th of September last—"Talavera is nearly ripe, but such has been the untowardness of the season, I do not expect any other wheat to make any return." This testimony is in favour of its early habits and hardihood also. It is what the French have long sought for—both a winter and a spring wheat.

4th. *Early maturity and severance of crop.*—The wheat appeared in 25 days, on the 1st of March; it was in bloom on the 30th of June, and was chopped on the 17th of August, a week sooner than the Whitington, which was sown nearly a month before it.

5th. *Tendency to degenerate and liabilities to disease.*—There is no tendency to degenerate observable in this wheat, as far as the experience of five or six years goes; nor from its early habits is it at all likely to become intermixed by fecundation from other varieties, though sown about the same period, as it will, in such cases, flower a fortnight or three weeks before them. It is not more liable to disease than ordinary white wheats, and affords a very fine, clear white straw: it is indeed one of the Italian bonnet-making varieties. There is, however, one disadvantage in it, which is, that the ear is so heavy that it is apt to break down, though not break off, when swept by a gale about the period of ripening; but it has a countervailing good quality, of ripening the grain equally well though bent down; as is the case with spring wheats, which ripen their seed well though quite laid, which with

winter wheats is doubtful. Another peculiarity is the tenacity of the chaff to the ear, more remaining on it after passing through the threshing-machine than any other variety I am acquainted with.

6th. *Amount of produce in grain, chaff, and straw, and the relative quantities of flour and offal.*—The amount of produce in grain was 52 Imperial bushels to the acre; the grain is so large that it tells in the measure; the sample very beautiful, as a bushel of it, which will be produced at the Oxford Meeting, will show—uniform, clear, and thin-skinned. Hence the weight in grain at 61lbs. the bushel, was 3172lbs., the weight of chaff 282lbs., and of straw 5480lbs. The quantity of flour obtained was 2485lbs., the quantity of pollard 38lbs., and of bran or offal 588lbs. The bread made from this flour is incomparably the best that I have met with; it is light, very white, and preserves its moisture almost as long as bread made from spring wheat. It is, moreover, so sweet and well-flavoured, as to appear to some palates more like cake than ordinary bread. Independently of the large proportion of flour it affords, it makes much of this fine bread; 18lbs. of the flour, having absorbed more water than the last described, gave 25lbs. of bread.

Crop.

	£.	*s.*	*d.*
48 bushels, at 8*s*. per bushel . . .	19	4	0
4 ditto Tailings, at 5*s*.	1	0	0
Straw, 48¾ cwt., at 1*s*. the cwt. . .	2	8	9
	22	12	9
Charges to deduct, as per Whitington .	14	0	0
Profit	£ 8	12	9

The weights of 18lbs. or 27lbs. used for the flour to be baked are intended to be comparative experiments of weights of nines, it being generally understood, especially in baking bread and serving it out to troops, that 9lbs. of common flour will make 11lbs. of bread. All those, however, that I have experimented on afforded more: the two lowest having afforded, from 18lbs. of flour, 22lbs. 9oz., and 23lbs.; the former of my own growth, the latter made from wheat imported from Rostock and Dantzic mixed.

In all the cases detailed, the succeeding crop was not allowed to interfere with the wheat crop; the clovers and artificial grasses having been sown subsequently to the harvest, after one light ploughing.

In some cases I have sown the clovers and grasses after the second hoeing, but always, I am inclined to think, at some expense to the wheat crop; the coronal roots of which may be deprived of a share of their nutriment when the grass seeds begin to draw nourishment from the soil, and the thousands of mouths which they present may deprive the wheat of much pure air, and themselves exhale gases which may be injurious to the plants.

Nothing can be more apparent than the sudden check wheat sometimes receives at the moment the grasses appear to take possession of a portion of the juices of the earth, which probably should be entirely devoted to the nutriment of so valuable a crop as wheat. This is of itself an inquiry well worthy the nicest investigation.

The following sorts I have also grown experimentally, but not having raised them in quantities sufficient to warrant a positive opinion, which probably might only tend to mislead, they are merely named. It is to be observed that a little calculation might have offered all the replies required by the conditions stated in the margins:—

The "Golden Drop" is one of the best red wheats, affording great produce in corn and straw, and a larger quantity of flour than some white wheats.

Hickling's "Prolific Red" is a productive variety, but rather coarse.

Brown's "Ten-rowed Chevalier," or prolific, is well named, where it suits the soil and climate; it has borne a fine crop with me, but it unfortunately has sported much into a pale red sort, owing no doubt to the seed which I obtained from Mr. Brown himself having been accidentally impregnated by a red sort; it is, when pure, a very fine variety.

"Gale's Hampshire" is an enormously productive sort of bearded wheat, which may be hereafter described.

"Essex Red." A very good variety.

"The Duck's Bill" wheat is very productive, but shedding greatly, and not very farinaceous.

J. Le Couteur.

Belle-Vue, Jersey,
December, 1838.

In order to present the particular points of comparison between the four principal varieties forming the subject of this Essay, at one glance, the results are appended in a tabular form.

COMPARATIVE STATEMENT OF THE RESULTS.

	Soil.	Manure.	Quantity of seed per acre.	Time of Sowing.	Har-vested.	Produce per Acre.				Produce per Acre in		Produce of Bread from 18 lbs. of Flour.	Net Profit.		
						Grain.	Straw.	Chaff.	Weight of bushel.	Finest Flour.	Flour, &c. (Pollard and Bran.)				
						bush.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	£.	*s.*	*d.*
WHITE DOWNY.	Argillaceous Schist, light and rich	Kelp Ashes, 9 qrs.	2 bushels	Jan. 29.	Aug. 16.	48	4557	315	62	2402	542	25	7	4	9
JERSEY DANTZIC.	Ditto.	Ditto.	Ditto.	Ditto.	Aug. 12.	43½	4681	430	63	2161	606	25¾	5	9	9
WHITINGTON.	Ditto on a red clay bottom.	2 hhds. of lime, 6 qrs. lime ashes, 5 qrs. kelp ashes.	3 bushels	Jan. 8.	Aug. 24.	33	7786	483	61	1454	524	23⅔	2	7	6
BELLE-VUE TALAVERA.	Ditto.	Ditto.	3 bushels	Feb. 3.	Aug. 17.	52	5480	282	61	2485	626	25	8	12	9

N.B. In the estimate of profit in the last column the calculation is not made with relation to the respective values of the wheats, as to their productiveness in flour, which it might be, but according to the ordinary marketable value of good wheat; the straw is valued as intended for manure.

XI.—*On Rural Economy Abroad.*—An Essay to which the Society's Gold Medal and Twenty-five Sovereigns were awarded in July, 1839.—By J. STANLEY CARR, Esq., of Fuschenbach, in the Duchy of Luxemburg.

FEELING it to be the duty of every large landowner, in whatever country, and however humble his talents may be, to respond to your call for information, I shall venture to offer, from time to time, an account of the husbandry of the North of Germany, beginning with my own immediate neighbourhood.

The Mecklenburgs.—These countries, about 100 miles long and 60 broad, are situated between the Baltic on the north, Pomerania on the east, Brandenburg on the south, and Holstein and Luneburg on the west. From north to south there is a ridge of elevated sandy land (the same which may be traced from the Bannat in Hungary to Jutland in Denmark), varying from 10 to 20 miles in breadth, affording miserable crops of corn and worse pasture; but the soil improves on both sides towards the Elbe and the Baltic, where fine districts of rich loams and clays are managed with considerable plodding industry. The size of farms varies from 50 or 60 acres, in the hands of the peasantry, to 300, and even 2000 acres, cultivated by farmers, but more frequently by the proprietor. A comfortable country-house is usually situate about the middle of the estate, flanked by rows of very large buildings, often 200 feet long, by 60 broad:—1st, a stable, &c.; 2nd, cow-house and dairy, the number of cows varying with the extent of the farm, but often amounting to 300 or 400, exclusive of young cattle and oxen; 3rd, a sheep house, to contain from 500 to 5000 sheep; and lastly, barns, for putting the whole of the crops under cover. The threshing-floor extends through the whole length of the house, and is large enough to admit a full 4-horse waggon of corn, and to give shelter to a dozen at a time if necessary, which is often of much consequence in catching seasons; and although these large buildings are a serious expence at first, they require little repair, and facilitate harvesting greatly.

Mecklenburg, situated in the same latitude as Yorkshire, with a climate warmer and dryer in summer, and colder in winter, is prosperous, although the rotations are defective, and the agricultural implements of remote antiquity. The instrument which serves as a substitute for a plough is called a haken, and the same as the Romans used, according to Loudon (page 112, figure 13 *b*). The harrows are often with wooden teeth, and in using them the driver lunges 5 horses with a harrow each, in a circle of about 10 yards in diameter, half the round at a quick walk and the rest at a trot, and as he steps backwards slowly a few inches at a time,

the work advances. The system of cultivation is to tear up the pasture intended for fallow with the hacken, in autumn, leaving a large rough clod exposed to the winter. As soon as frost and snow have made all hard and even, 4-horse waggons are employed to carry out the long fresh dung from the yards, which is spread at once over the land, where it lies exposed till the dry weather of spring admits of its being worked under with the same implement. After some weeks a favourable moment is taken for harrowing, with a heavy brake, and subsequently with the small wooden harrows, which work the couch grass to the surface. Two furrows are afterwards given, and where the land has a sufficient proportion of clay, rape-seed is sown broadcast in the end of July or beginning of August; this crop is greatly benefited the following spring by dusting gypsum over it, about 100 lbs. to the English acre. In July the seed is ripe, and as the weather is generally fine, is trodden out by horses, very expeditiously, on large canvass sheets in the field. The oil of this seed, when purified, is without smell, gives a brilliant clear-burning flame, and is universally used all over Germany, in the saloon and the cottage. The value of the crop is very precarious, because it is subject to so many contingencies; the turnip-fly, slug, and caterpillar, make war upon it when young, and when in flower a small beetle (Haltica nemorum) often eats away the blossom-bud, or lays its minute larvæ in the petals, ultimately furnishing every pod with a maggot, which either eats the seed away, or, forcing the pod open when nearly ripe, causes it to fall out. When spared all these calamities it is, however, a very remunerating crop, worth from 10*l.* to 20*l.* an acre, especially if there is a foreign demand. The straw is generally burned, and the ashes scattered over the field; it is sometimes sold to the soapboilers who value it highly. Two furrows are then given for wheat, sown broadcast in September.

The usual rotation, 10 years ago, would then have been to sow barley followed by oats, and if the land could bear it, oats again, laid down with a little red clover and grass seeds, for 3 or 4 years. But agricultural knowledge has much increased by the example of individuals and well-organised associations. The improved rotations are now generally of 10 years, viz.:—1st year, fallow, well dunged; 2nd, rape; 3rd, wheat; 4th, barley; 5th, (light dunging) peas; 6th, rye; 7th, oats, sown down with rye or timothy-grass and red clover, which, as well as the peas, is gypsumed with great effect before the dew has left the plant of a May morning. The clover is mown twice for hay, and left two years longer for pasture.

The means of obtaining a sufficient quantity of manure for

such a scourging course, where neither composts, bones, nor any other substitutes are resorted to, are deserving of notice. In the first place the beginning of all improvements in these countries is to give a dressing of *marl* (containing on an average 60 per cent. carbonate of lime), at the rate of 164 cubic feet per acre; by this means land not worth cultivation previously yields excellent crops for 8 or 10 years, and if the straw produced during that time is carefully converted into manure, the productiveness does not materially decrease. Should that, however, be the case, the deposits of ponds, and even plots of peat moss, which not unfrequently occur, are carried upon the fallows in winter, where these substances, when broken down by the frost, prove a valuable alterative to the texture of the soil, especially where the pulse, rape, and clover crops are gypsumed.

The maintenance of the various stock by which the manure is produced (and which is debarred from pasturage during six months of the year by climate) comes next to be considered. There has long been a useful breed of horses in these duchies, suited to sandy roads, where a 5 mile-an-hour pace was all that was compatible with the safety of the carriages; but now that good M'Adamized roads are becoming more frequent, they have not lungs nor action enough, and the breed is being supplanted by a cross from English thoroughbred and other stallions, to which the magnificent studs of the late and present Counts Plessen, of Ivenack; the Counts Bassiwitz and Hahn; and Barons de Maltzahn and Biel have chiefly contributed. The farm-horse is a long-legged, small-bodied, big-headed, shapeless animal, bred in Holstein or the Danish islands, his price from 15*l.* to 20*l.*, and 2 tons is a load for 4 of them, in a waggon, over country roads.*

The *haken* is generally worked by 2 oxen, which, with the cows, are tended during the summer upon the pastures, and from the time the corn fields are cleared, upon the stubble and young clovers till November, when they are taken into the house, and fed with hay and straw, during the winter. A great desideratum in these countries where turnip culture is unknown, is a considerable proportion of natural meadows, along the banks of rivers, or reclaimed from peat bogs. The warm summers force the indi-

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* English stallions have been long employed in Mecklenburg for the improvement of saddle-horses. I myself purchased a pair from the late Count Plessen full 30 years ago: they were got by one of our celebrated racers, and bred upon his estate. He then had 120 brood-mares, and his stock commanded rather high prices. The farm-cattle of the neighbourhood were then, however, not worth more than half the prices above mentioned.—F. Burke.

genous swamp plants into luxuriance, and two crops of coarse hay are generally obtained. It cannot be expected that dairy cows, even in cases where they get the addition of some sheaf oats for some weeks in spring, can yield a great quantity of milk after being kept for six months entirely on dry food, but they are necessary, even if not very remunerative, to convert the straw and hay into manure, and are generally let to a dairy-man at about 2*l.* 10*s.* per head.

The Saxon or Merino Sheep, however, is the animal which best remunerates the Mecklenburger, and forms the especial object of his care and attention. They were brought to these countries from Saxony, about the year 1811, and are now universal. The greatest pains are taken to produce fleeces as nearly equal as possible over the whole flock. The nature of this sort of sheep is so little known in England, although an object of such vital importance to the British Australian Colonies, that I venture to hope a description of it may be acceptable.

The Merino is a long-legged, narrow-bodied, ugly animal with a fleece varying in weight, in proportion to its coarseness, (although fine wool is specifically heavier than coarse) from 2 to 3lbs. The staple is very close and thick growing, greasy or oily to the feel, elastic and soft, very tenacious, and formed differently from any other wools, with a number of regular, minute bends, or curls, in each hair. There are always different sorts of wool upon the same sheep, and that animal is of course the most esteemed which produces the highest qualities in the greatest proportion. Breeding successfully with this view is a most difficult science, requiring years of pains-taking intelligence to attain. I was present at the exhibition of 22 rams at the cattle show of Güstrow in Mecklenburg, in May 1837. The specimens, to an inexperienced eye, appeared much alike; they were carefully washed and shorn, the fleeces numbered and sent to the most eminent wool-staplers at Leipsic, where they were submitted to accurate assortment and valuation. I annex a translation of the published document, by which it will be seen how enormous the difference in value, between one flock and another, of nominally the same animal, may be. The Merino is supposed to be indigenous to Spain, and known to have been first introduced into Germany in 1765 by the then Elector of Saxony. Shortly after (about 1775) another small flock was brought to Austria, and subsequently in 1786, and 1802, to the imperial domains of Holditch in Hungary, and Mannersdorf in Austria. From these small beginnings has this valuable animal been spread over these immense countries. But there are two distinct breeds, which differ materially in shape, and the quality of their wool.

1st.—The Infantado, or Negretti, distinguishable by shorter

legs, and a stouter make; the head and neck generally short, and broad, the nose short and turned up, and the body round like a barrel. The wool is often matted upon the neck, back, and thighs, and grows upon the head to the eyes, and upon the legs to the very feet. The grease in its fleece is almost pitchy, and as the dust becomes incorporated with it, the washing is a matter of difficulty, and risk; the greatest care is at all times necessary in this operation. A warm mild day, without harsh or drying wind, is indispensable, and care must be taken never to rub the fleece with the hand. A marl-pit with a depth of from 8 to 10 feet of clear water is a favourite washing-place, and is thought to become better every year. The sheep are thrown in from a stage in the evening, and made to swim the whole length of the pond, (20 to 30 yards) between rails, with boards on one side, from which women or boys assist them through their bath, by placing wooden rakes or crooks under their chins, and so passing them onwards. When the water has dripped from the fleeces for an hour or two, the sheep are put into a house for the night, as close together as possible, in order to cause the greater evaporation, and the next day they are swum three or four times through the same pond, the last time the head being rubbed a little, and they are kept in the house (well supplied with clean straw) on dry food, for three or four days, until the wool, by sweating as it is termed, has recovered its characteristic softness. The fleece of this species is generally thick, closely grown, and abundant. Ewes may average $2\frac{1}{4}$ and even $3\frac{1}{4}$ lbs. by careful feeding (which however must never approach to feeding to be fat, else the wool becomes wiry and hard), and rams and wedders may bring 4 lbs, and even 6 lbs. This is the animal which came to Austria from Spain.

The other distinct breed is the Saxon importation, and is called Escurial. Their shape differs markedly from the Infantados, longer legged, with a long spare neck and head, with very little wool on the latter: a finer, shorter, and softer character in its fleece, but deficient in quantity. $1\frac{1}{2}$ to 2 lbs. is frequently the amount from ewes, and 2 to 3 lbs. from rams and wedders. On being presented to the Elector of Saxony in 1765, they received the appellation of Electorals. A great deal of trouble has been taken to combine the advantages of both breeds by crossing, but with doubtful advantages; and although the mixed breed has been found suitable for crossing with sheep not thorough-bred (called Mestizen), yet experience has shown, that to breed with advantage, all the rams, be the ewes what they may, should be either thorough-bred Infantados or Escurial, and that the same strain of blood should be persevered in; I know an instance where a large and valuable flock has been for years retrograding, in consequence of

one unsuitable ram having been introduced 12 or 14 years ago. Good rams are of course becoming every year more attainable, but there are examples of breeders in Saxony who still obtain, for distinguished rams, as much as 100, 200, and even 300 Louisdors*.

I am aware that these sheep have frequently been brought to Britain† from Spain, but there never was labour more lost, as they cannot thrive in a damp climate; besides, it is quite necessary that they should have a wide range of dry and hilly pasture, of short and not over-nutritious herbage. If allowed to feed on swampy or marshy ground, even once or twice in autumn, they are sure to die of liver-complaint in the following spring. If they are permitted to eat wet grass, or exposed frequently to rain, they disappear by hundreds with consumption. In these countries it is found that the higher bred the sheep is, especially the Escurial, the more tender. They are always housed at night, even in summer, except in the very finest weather, when they are sometimes folded in the distant fallows; but never taken to pasture till the dew is off the grass. In winter they are kept within doors altogether, and are fed with a small quantity of sound hay, and every variety of straw which has not suffered from wet, and which is varied at each feed: they pick it over carefully, eating the finer parts, and any corn that may have been left by the threshers. Abundance of good water to drink, and rock-salt in their cribs, are indispensables.

In letting a large farm the usual calculation is, that the clear returns from the sheep and dairy should pay the rent, always including taxes; and that the corn sold should cover the labour and other expenses of the farm, support the farmer's family, and leave a surplus, more or less, in proportion to the industry and skill employed.

The farm-servants consist of active young men, lodged and fed in the house, and paid from 5*l.* to 6*l.* wages per annum (including perquisites, called sack-money, for all grain sold), who take charge of four horses and one waggon each, plough, &c. &c. These are assisted by married labourers, who have a free house and firing, a cow kept, about one English rood of garden (which is well manured every second year), and twice as much potatoe-land; which, together, supply them with abundance of fruit (fresh and dried), vegetables, and potatoes, for their families; and

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* The Louisdor is worth rather more than 19 shillings.

† The disuse of the pure Merino in this country may rather be ascribed to the circumstance that our breeders look to the mutton for their profit, and the Germans to the wool.—F. Burke.

serve also to bring up and fatten a pig or two annually, which forms the chief part of their animal food. Their wives work at all times when required, but especially in harvest, when they are employed in binding the corn, which the men mow. The wages may be averaged for men, from the 1st of May to the 1st of November, at 10*d.*, and in winter 8*d.* per day; the women always 2*d.* less. The men earn much more by hand-threshing, in which they are employed from the time the harvest is housed till May or June, and for which they get 1 sack in every 14, 16, or 18, according to their agreement, which is influenced by the abundance or scarcity of hands in the neighbourhood, and the probable returns from good land or bad. They frequently earn 16*d.* a-day by their work, when prices are good; and even at the lowest, they have bread for their families, and to spare. Poverty is rare, seldom occurring except from misfortune or sickness; and in such cases they are supported by the lord of the soil, so that wandering beggars are unknown. The rent of land has increased within the last 20 years by 50 per cent., and may now be averaged at about 18*s.* sterling per acre for a mixed farm of wheat and barley soils. Petty crime is as little frequent as in any other country that could be named, while open violence is almost unheard of.

Assortment and Valuation of 22 Wool Fleeces, sent to us by the Count de Osten Sacken, President of the Mecklenburg Patriotic Society.

(Signed) T. B. Heyer.
G. Voss.
F. Hartmann.
E. Faber.

Leipzig, 14*th Nov.* 1837.

FLEECE No. 6.

Assortment.	Price, in Leipzig, of 1836. Per cwt. of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
Super Electoral	180	57	2	21	11⅜
Electoral pieces	120	7¾	..	6	4
Prima ditto	80	1	..	..	6½
Secunda ditto	55	¼	..	..	1⅛
Fine yellow	80	1	..	..	6¼
Points	45	½	..	..	1¾
Refuse	..	⅛	..	..	..
Wt. and val. of whole fleece		67⅝	3	5	7

FLEECE No. 15.

Assortment.	Price, in Leipzig, of 1836. Per cwt. of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
First Prima	110	49¼	1	12	11¼
Second ditto	80	14	..	7	7⅝
First Prima piece	90	2	..	1	2⅝
Second ditto	70	18	..	8	7
Secunda	55	4	..	1	6
Tertia	45	1½	..	..	5½
Fine yellow	70	2	..	..	11⅜
Food	60	1½	..	..	7⅜
Points	35	1½	..	..	4¼
Matted wool	..	1	..	..	..
Refuse	..	½	..	..	..
Wt. and val. of whole fleece		95¼	2	10	3

FLEECE No. 3.

Assortment.	Price per cwt. (Doll.)	Half Oz.	Dollars.	Groschen.	Pence.
Super Electoral	170	57½	2	14	8⅝
Electoral pieces	110	11½	..	8	7½
Prima ditto	80	3¼	..	1	9¼
Secunda ditto	55	¼	..	..	1⅛
Fine yellow	80	4¾	..	2	7
Points	45	½	..	..	1¾
Matted wool	..	1½	..	..	..
Refuse	..	1/16	..	..	..
Wt. and val. of whole fleece		79 5/16	3	3	11¼

FLEECE No. 2.

Assortment.	Price per cwt. (Doll.)	Half Oz.	Dollars.	Groschen.	Pence.
First Prima	110	51½	1	14	7½
Second ditto	80	7¾	..	4	11⅛
First Prima piece	90	5½	..	3	4½
Second ditto	70	12½	..	5	11½
Secunda	55	2	..	..	9
Tertia	45	½	..	..	1¾
Fine yellow	70	1	..	..	5⅝
Points	35	1¼	..	..	3½
Matted wool	..	¼	..	..	..
Refuse	..	¼	..	..	..
Wt. and val. of whole fleece		82½	2	6	6½

Note.—A Prussian dollar is as nearly as possible 3 shillings sterling; each dollar has 30 groschen, and each groschen has 12 pence.

FLEECE No. 10.

Assortment.	Price, in Leipzig, of 1836. Per cwt. of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
Super Electoral .	160	57¼	2	14	5⅜
Electoral pieces .	110	12	..	9	..
Prima ditto . .	80	5	.	2	8⅝
Second ditto . .	55	1	.	..	4½
Fine yellow . .	80	3	.	1	7⅝
*Food	70	1	.	..	5⅝
Points . . .	45	1	.	..	3¾
Matted wool . .	..	1⅛	.	..	..
Refuse . . .	..	⅜	..	..	..
Wt. and val. of whole fleece		81¾	3	4	11½

FLEECE No. 5.

Assortment.	Price, in Leipzig, of 1836. Per cwt. of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
First Prima . .	110	37	1	3	9
Second ditto . .	80	16	..	8	8⅝
First Prima piece	90	1	..	..	7⅜
Second ditto . .	70	19	..	9	¾
Secunda . . .	55	1¼	..	..	5⅝
Tertia . . .	45	½	..	..	1¾
Fine yellow . .	70	3½	..	1	8
Food	60	3½	..	1	5⅛
Points . . .	35	2	..	..	6
Matted wool . .	..	2	..	..	..
Refuse . . .	..	½	..	..	..
Wt. and val. of whole fleece		86¼	2	2	4¼

FLEECE No. 18.

First Prima . .	100	63	1	18	10¾
Second ditto . .	80	25½	..	13	10⅞
First Prima piece	90	2	..	1	2⅝
Second ditto . .	70	32	..	15	3¼
Secunda . . .	55	3	..	1	1½
Tertia . . .	45	½	..	..	1¾
Fine yellow . .	70	2	..	..	11⅜
Food	60	1	..	..	4⅞
Points . . .	35	1½	..	..	4¼
Matted wool . .	..	2	..	..	..
Refuse . . .	..	⅛	..	..	..
Wt. and val. of whole fleece		132⅝	3	4	3¼

FLEECE No. 4.

Prima . . .	95	47½	1	6	9¼
Secunda . . .	80	21	..	11	5⅜
First Prima piece	90	7	..	..	7¼
Second ditto . .	70	15	..	7	1⅞
Secunda piece .	50	7¼	..	2	5⅝
Tertia ditto . .	40	1½	..	..	4⅞
Food	55	5½	..	2	⅜
Fine yellow . .	65	1	..	..	5¼
Points . . .	30	1	..	..	2⅜
Matted wool .	..	½	..	..	..
Refuse . . .	..	¼	..	..	..
Wt. and val. of whole fleece		101½	2	7	6⅛

FLEECE No. 11.

First Prima . .	100	55½	1	13	10
Second ditto . .	80	8	..	4	4¼
First Prima piece	90	1½	..	..	11
Second ditto .	70	22	..	10	6
Secunda . . .	55	2	..	..	9
Tertia . . .	45	½	..	..	1¾
Fine yellow . .	70	11	..	5	3
Points . . .	35	2½	..	..	7⅜
Food	60	½	..	..	2⅜
Matted wool . .	..	3¾	..	..	..
Refuse . . .	..	¼	..	..	..
Wt. and val. of whole fleece		107½	2	12	6¾

FLEECE No. 19.

Prima . . .	95	45½	1	5	5⅝
Secunda . . .	80	22	..	12	..
First Prima piece	90	5	..	3	¾
Second ditto . .	70	15½	..	7	4¾
Fine yellow . .	65	2	..	..	10⅝
Points . . .	30	½	..	..	1⅛
Matted wool . .	..	⅝	..	..	..
Refuse . . .	..	¼	..	..	..
Wt. and val. of whole fleece		91⅜	2	4	10⅞

* The technical name for wool destroyed in careless feeding by hay-seeds and dust falling upon the neck.

FLEECE No. 13.

Assortment.	Price, in Leipzig, of 1836. Per cwt., of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
First Prima . .	100	74	2	2	$5\frac{3}{8}$
Second ditto . .	80	12	..	6	$6\frac{1}{2}$
First Prima piece	90	$1\frac{1}{4}$	..	..	$9\frac{1}{8}$
Second ditto . .	70	24	..	11	$5\frac{3}{8}$
Secunda piece .	55	$1\frac{3}{4}$	..	..	$7\frac{7}{8}$
Fine Yellow . .	70	7	..	3	4
Points . . .	35	2	..	..	$5\frac{5}{8}$
Matted Wool .	..	$1\frac{1}{2}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		124	3	4	$7\frac{7}{8}$

FLEECE No. 19.

Assortment.	Price, in Liepzig, of 1836. Per cwt., of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
Prima	95	$82\frac{1}{2}$	2	5	$5\frac{1}{4}$
Secunda . . .	80	9	..	4	$10\frac{7}{8}$
Prima piece . .	68	$3\frac{1}{2}$	..	1	$7\frac{3}{8}$
Secunda ditto .	53	$30\frac{1}{2}$	..	11	$\frac{1}{4}$
Tertia ditto . .	40	1	..	..	$3\frac{1}{4}$
Yellow . . .	65	$4\frac{1}{2}$	..	1	$11\frac{7}{8}$
Points	30	$3\frac{1}{2}$	..	..	$8\frac{1}{2}$
Matted Wool .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		135	3	1	$11\frac{3}{8}$

FLEECE No. 20.

A sort of Prima	95	$70\frac{1}{4}$	1	21	6
Do. Secunda .	80	13	..	7	1
Prima pieces .	68	17	..	7	$10\frac{1}{2}$
Secunda, do. .	53	$5\frac{1}{2}$	..	1	$11\frac{3}{4}$
Tertia . . .	40	$1\frac{1}{2}$	..	..	$4\frac{7}{8}$
Yellow . . .	65	3	..	1	$3\frac{7}{8}$
Points . . .	30	$3\frac{1}{4}$	..	..	$7\frac{7}{8}$
Matted Wool .	..	2	..	..	..
Refuse . . .	..	$\frac{1}{4}$	..	..	..
Wt. and val. of whole fleece		$115\frac{3}{4}$	2	16	$9\frac{7}{8}$

FLEECE No. 9.

A sort of Secunda	80	61	1	9	$3\frac{1}{4}$
Ditto Tertia .	70	8	..	3	$9\frac{3}{4}$
Secunda piece .	50	$9\frac{1}{2}$	..	3	$4\frac{1}{2}$
Tertia ditto . .	45	$28\frac{1}{2}$	..	8	$8\frac{7}{8}$
Quarta ditto . .	40	6	..	1	$7\frac{5}{8}$
Yellow . . .	50	2	..	..	$8\frac{1}{4}$
Food	45	1	..	..	$3\frac{5}{8}$
Points	30	$4\frac{1}{2}$	..	..	11
Matted Wool .	..	$5\frac{3}{4}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		$126\frac{3}{4}$	2	4	$8\frac{3}{4}$

FLEECE No. 1.

A sort of Secunda	85	$40\frac{1}{2}$	..	23	$5\frac{5}{8}$
Ditto Tertia .	75	38	..	19	$5\frac{1}{8}$
Secunda piece .	55	$20\frac{1}{2}$	..	7	$8\frac{1}{4}$
Tertia ditto . .	45	$19\frac{1}{2}$	..	5	$11\frac{3}{4}$
Yellow . . .	55	$\frac{1}{2}$	..	..	$2\frac{1}{4}$
Points . . .	35	11	..	2	$7\frac{1}{4}$
Food . . .	48	$3\frac{1}{4}$	..	1	$\frac{3}{4}$
Matted Wool .	..	$12\frac{1}{2}$	..	..	..
Refuse . . .	..	$\frac{1}{4}$	..	..	..
Wt. and val. of whole fleece		146	2	12	5

FLEECE No. 17.

A sort of Secunda	85	$38\frac{1}{2}$	..	22	$3\frac{5}{8}$
Ditto Tertia .	75	7	..	3	$6\frac{7}{8}$
Secunda piece .	55	30	..	11	3
Tertia ditto . .	45	12	..	3	$7\frac{1}{4}$
Quarta ditto . .	40	$1\frac{1}{2}$	..	..	$4\frac{7}{8}$
Yellow . . .	55	$3\frac{1}{4}$	..	1	$\frac{7}{8}$
Food . . .	48	3	..	..	$11\frac{5}{8}$
Points . . .	30	$1\frac{1}{2}$	..	..	$3\frac{5}{8}$
Matted Wool .	..	$1\frac{1}{8}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		$98\frac{3}{8}$	1	19	$5\frac{3}{4}$

FLEECE No. 8

Assortment.	Price in, Leipzig, of 1836.	Value and Weight of the different parts of the Fleece.			
	Per cwt., of 110 lbs., reckoned in Prussian Dollars.	Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
A sort of Secunda	85	39	..	22	$7\frac{1}{8}$
Ditto Tertia .	75	28	..	14	$3\frac{3}{4}$
Secunda piece .	55	22	..	8	3
Tertia ditto . .	45	19	..	5	$9\frac{7}{8}$
Food	48	$4\frac{1}{2}$	..	1	$5\frac{5}{8}$
Yellow . . .	55	$4\frac{1}{2}$	..	1	$7\frac{1}{8}$
Points . . .	35	11	..	2	$7\frac{1}{2}$
Matted Wool .	..	$\frac{1}{2}$	..	..	..
Refuse . . .	..	$\frac{3}{8}$	..	..	..
Wt. and val. of whole fleece		$128\frac{5}{8}$	2	8	8

FLEECE No. 7.

Assortment.	Price, in Leipzig, of 1836.	Value and Weight of the different parts of the Fleece.			
	Per cwt. of 110 lbs. reckoned in Prussian Dollars.	Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
A sort of Secunda	80	46	1	1	1
Ditto Tertia .	65	23	..	10	$2\frac{1}{4}$
Secunda piece .	55	6	..	2	3
Tertia ditto . .	45	$28\frac{1}{2}$	..	8	$8\frac{7}{8}$
Quarta ditto . .	40	$18\frac{1}{2}$	..	5	$\frac{1}{2}$
Quinta ditto . .	30	5	..	1	$\frac{1}{4}$
Food	48	$5\frac{1}{4}$	..	1	$8\frac{5}{8}$
Yellow . . .	55	$2\frac{1}{2}$	..	..	$11\frac{1}{4}$
Points . . .	30	4	..	..	$9\frac{3}{4}$
Matted Wool .	..	$2\frac{3}{4}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		142	2	7	$9\frac{1}{2}$

FLEECE No. 14.

A sort of Secunda	80	85	1	22	$4\frac{1}{4}$
Ditto Tertia .	65	26	..	11	$6\frac{1}{4}$
Secunda piece .	55	21	..	7	$10\frac{3}{8}$
Tertia ditto . .	45	14	..	4	$3\frac{1}{2}$
Yellow . . .	55	$\frac{1}{4}$	..	..	$1\frac{1}{8}$
Food . . .	48	$\frac{1}{4}$	..	..	$\frac{7}{8}$
Points . . .	30	$6\frac{1}{2}$	..	1	$3\frac{7}{8}$
Matted Wool .	..	$2\frac{1}{2}$	..	..	..
Refuse . . .	..	$\frac{1}{4}$	..	..	..
Wt. and val. of whole fleece		$155\frac{3}{4}$	2	23	$6\frac{1}{4}$

FLEECE No. 23.

A sort of Secunda	80	$15\frac{1}{2}$	..	8	$5\frac{3}{8}$
Ditto Tertia .	65	$45\frac{1}{4}$	..	20	$\frac{5}{8}$
Secunda piece .	55	$44\frac{1}{4}$	..	16	$7\frac{1}{8}$
Tertia ditto . .	45	33	..	10	$1\frac{1}{2}$
Food	45	2	..	..	$7\frac{1}{4}$
Points . . .	30	$4\frac{1}{4}$	..	..	$10\frac{3}{8}$
Matted Wool .	..	$\frac{1}{4}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		$145\frac{1}{2}$	2	8	$8\frac{1}{4}$

FLEECE No. 22.

A sort of Secunda	80	$20\frac{1}{2}$	..	11	$2\frac{1}{8}$
Ditto Tertia .	65	50	..	22	$1\frac{7}{8}$
Secunda piece .	55	$2\frac{1}{4}$	..	..	$10\frac{1}{8}$
Tertia ditto . .	45	$42\frac{1}{2}$	..	16	$5\frac{3}{8}$
Quarta ditto . .	40	$10\frac{1}{2}$	..	2	$10\frac{1}{4}$
Yellow . . .	55	2	..	..	9
Food	45	$8\frac{3}{4}$	..	2	$8\frac{1}{8}$
Points . . .	30	7	..	1	$5\frac{1}{8}$
Matted Wool .	..	$1\frac{1}{4}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		$145\frac{1}{4}$	2	10	4

FLEECE No. 21.

A sort of Tertia .	60	12	..	4	$10\frac{7}{8}$
Ditto Quarta .	81	70	..	22	$10\frac{7}{8}$
Tertia pieces . .	44	$26\frac{1}{2}$	..	7	$11\frac{3}{8}$
Quarta ditto . .	40	40	..	10	$10\frac{7}{8}$
Yellow . . .	40	$\frac{1}{2}$	..	..	$1\frac{5}{8}$
Points . . .	25	$6\frac{1}{2}$	..	1	$1\frac{1}{4}$
Food	33	$5\frac{1}{2}$	..	1	$2\frac{3}{4}$
Matted wool . .	..	$\frac{1}{2}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		162	2	1	$1\frac{5}{8}$

XII.—*An Essay on making Compost Heaps from Liquids and other Substances; written on the evidence of many years' experience.*—To which the Prize of Ten Sovereigns was awarded in July, 1839.—By James Dixon, Esq. Secretary to the Manchester Agricultural Society.

The force and power of an agriculturist to produce good crops mainly depends on the manures he can command; and how to derive the greatest possible benefits from his immediate resources is one of the most useful subjects that can engage his attention. The English Agricultural Society having offered a premium for the best mode of making compost heaps, I venture to forward the Committee my ideas on this most important branch of rural management; and in doing this I shall state the course I have pursued in this particular for many years, and in which every additional experience inclines me not to make any systematic alteration.

My farm is a strong retentive soil, on a substratum of ferruginous clay; and being many times disappointed in what I considered reasonable anticipations of good crops, I determined on a new system of manuring. Though quite satisfied of the expence which would necessarily be incurred by my plan, I still determined on its adoption. At the onset I effectually drained a considerable part of my farm. My next object was how to improve its texture at the least cost—(perhaps I may be allowed to state that my holding has always been at rack-rent); for this purpose we carted great quantities of fine sawdust and peat-earth or bog; we had so far to go for the latter, that two horses would fetch little more than three tons in one day—one horse would fetch three cart-loads of sawdust in the same time. Having brought great quantities of both peat and sawdust into my farm-yard, I laid out for the bottom of a compost heap a space of considerable dimensions, and about three feet in depth: three-fourths of this bottom was peat, the rest sawdust; on this we conveyed *daily* the dung from the cattle-sheds; the urine also is conducted through channels to wells for its reception,—one on each side of the compost heap;—common water is entirely prevented from mixing with it. Every second day the urine so collected is thrown over the whole mass with a scoop, and at the same time we regulate the accumulated dung. This being continued for a week, another layer, nine inches or a foot thick, of peat and sawdust (and frequently peat without sawdust) is wheeled on the accumulated heap. These matters are continuously added to each other during winter, and in addition once in every week never less than 25 cwt., more frequently 50 cwt., of night-soil and urine; the latter are always laid next above the peat or bog-earth, as we think

it accelerates their decomposition. It is perhaps proper here to state that the peat is dug and exposed to the alternations of the weather for several months before it is brought to the heap for admixture; by this it loses much of its moisture. In some cases, peat contains acid or astringent matters, which are injurious to useful vegetation. On this I have not tried any decided experiment, but am led to the supposition by frequently seeing stones, some in a partial state of decomposition, others wholly decomposed in bogs, and at the depth of several feet from the surface. Some years' experience has convinced me of the impropriety of using recently dug peat; proceeding in the manner I recommend, it is superior and more convenient on every account —very much lighter to cart to the farm-yard or any other situation where it is wanted; and so convinced am I of its utility in composts for every description of soil, except that of its own character, that wherever it can be laid down on a farm at less than 4*s.* per ton, I should recommend every agriculturist and horticulturist that can command it, even at the cost here stated, to give it a fair trial. So retentive and attractive of moisture is peat, that if liberally applied to an arid, sandy soil, that soil does not burn in a dry season, and it so much improves the texture and increases the produce of an obdurate clay soil, if in other respects rightly cultivated, that actual experience alone can fairly determine its value.

For the conveyance of night-soil and urine, we have the largest and strongest casks, such as oils are imported in; the top of which is provided with a funnel to put the matters through, and the casks are fixed on wheels like those of a common dung-cart. For the convenience of emptying this carriage, the compost heaps are always lower at one end; the highest is where we discharge the contents, in order that they may in some degree spread themselves over the whole accumulation: the situation on which the wheels of these carriages stand while being discharged is raised considerably; this we find convenient, as the compost heap may be sloped six or seven feet high—low compost heaps, in my opinion, should be avoided. The plan here recommended I have carried on for some time. I find no difficulty in manuring my farm over once in two years; by this repetition I keep up the fertility of my land, and it never requires more than a moderate application of manure.

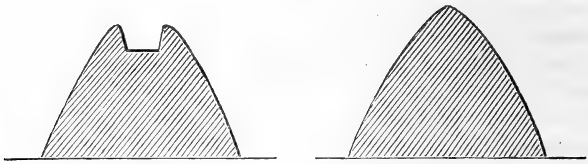
I am fully aware that there are many localities where neither peat nor night-soil can be readily obtained; but it is worth a farmer's while to go even more than twenty miles for the latter substance, provided he can have it without deterioration: the original cost is often trifling. On a farm where turnips or mangold are cultivated to some extent, the system here recommended will be almost incalculably advantageous; a single horse is sufficient

for one carriage—mine hold upwards of a ton each; 6 tons of this manure in compost with peat, or, if that is not convenient, any other matters, such as ditch scourings, or high headlands which have been properly prepared and laid dry in a heap for some time, would be amply sufficient for an acre of turnips or mangold. This manure is by far the most invigorating of any I have ever yet tried; bones in any state will bear no comparison with it for any crop; but it must be remembered that I write on the supposition that it has not been reduced in strength before it is fetched.

Convenience frequently suggests that compost heaps should be raised on different parts of a farm; but, unless in particular instances, it is well to have them in the yard: in the farm-yard all the urine from the cattle-stalls may be employed with the greatest economy; and be it remarked that the urine from animals, in given weights, is more powerful than their solid excrements.* How important then must it not be to the farmer to make the most extensive and the most careful use of this liquid! It is sometimes carted on the land, but that practice will not bear a comparison with making it into composts in the manner here recommended. Great waste is often made in putrescent manures after they are carted on the land; instead of being immediately covered or incorporated with the soil, we not unfrequently see them exposed for days together in the hot rays of a scorching sun, or to the injurious influences of a dry wind. I have before stated that compost heaps should on many considerations be raised in the farm-yard; still circumstances are frequently such that it is more proper to make them at some distance in the fields; if a headland becomes too high by frequent ploughings or working of the land, in that case it should be ploughed at the time when clover or mixed grass seeds are sown with a white crop, for instance, barley or oats, and clover for the year following: a headland might then be ploughed, and a number of cart-loads of some manure heaped from one end to the other. Immediately after this it should be trenched with the spade (or what is sometimes called digging), and ridged high, in order that an action should take place between the soil and manure; by this means the mass would soon be in a condition for turning over, and any ditch scourings, or other matters which had not in the first instance been used, might now be added to the mixture. The heap should then be allowed to remain closed for a few weeks, then turned over again; at this turning in all probability the mass would be much reduced; if sufficiently reduced, raise the ridge of compost well on both sides, but, instead of its top

* This must be taken with some limitations, for urine contains 90 to 95 per cent. of water; and unmixed dung contains all the salts of urine, besides much mucus and other substances.—W. L. Rham.

being pointed, make a trench or cavity on the top from one end of the heap to the other. This cavity should be made tolerably



retentive of moisture, which may be effected by treading with the feet; carriages of night-soil or urine from the cattle-stalls may then be emptied into the trench, and the bulk of the heap would determine how many were required: this being done, a little earth should be thrown into the trench, and the heap allowed to remain in that state until the middle or latter end of autumn; it will then be ready for another turning; but at this time care must be taken to have the heap well made up at the sides and pointed at the top; in this situation rain will be thrown off, and the compost preserved dry until winter presents some favourable opportunity for laying it on the young clover, wheat, or for making any other use of it which may be required.

The beneficial effects of top-dressing young clovers or mixed grass seeds is scarcely ever regarded with due attention. By this help crops are not only much increased, even 30 or 50 per cent., but they are also ready for cutting much sooner, which in a backward spring gives the stock farmer inestimable advantages for sorting his cattle, and thereby raising manure at his pleasure. The full effects of this practice I first experienced in the dry season of 1826: I had some clovers which had been manured the previous winter; my land was soon covered with crop, and that so vigorous a one, that the hot weather did not overpower it. My cows, that summer, were tied up during the day-time, and in the night they were turned out into the pastures; most of the stock in my district were much distressed from over-heat as well as from being short of food for some weeks; milk yielded little butter, scarcely any for a time was offered in our large market-town:—no doubt that year will be remembered by many gentlemen on the Agricultural Society's committee. I, however, was under no difficulties on account of the season: my clovers produced plenty of food for my cattle, and in return they yielded as much milk and butter as I ever recollect from the same number. I am persuaded that the same satisfactory results would have followed if the same system had been adopted for feeding stock; it was that year my attention was first directed to raising compost heaps from urine. This I now do frequently without the help of

any dung from the cattle-stalls; the same occasion called my mind to another matter well worthy every farmer's attention—I allude to the great superiority of the manure raised in summer soiling to that produced in the stalls during winter.* I verily believe the difference is 50 per cent. unless stock are fed in a great measure during winter with artificial food. In an arrangement for making compost heaps from urine, I would recommend a receptacle to be made at the back of the cattle-stalls just outside the building; this should hold about 20 cart-loads of mould, or any other matters to be employed; if its situation were a little lower than the cattle-sheds all the urine would pass into it, and remain there until the mass is completely saturated, which will be sufficient; when the earthy matters are covered over with it, the compost may then be thrown out and the proceeding again renewed. In order to show part of the benefits of this practice, I beg here to observe that the most foul or weedy mould may be used; the action of the urine, if not reduced by water, is so powerful, that wire-worms, the black slug, many other destroying insects, and all vegetables, weeds, &c. when in contact with the urine for a time are deprived of their living functions. The situation for raising this' compost should be protected from the weather by a covering similar to a cart-shed; indeed, the deteriorating influences of rain, sun, and arid winds, on all putrescent manures or compost are so serious, that in my humble judgment it would be worth while to have places under cover where these are usually laid down. The ordinary method of conveying manures on land admits of much improvement. I am now preparing carriages and a moveable railway for this purpose. Where compost is raised in the field, I am confident that I shall be able to effect a saving of 100 per cent. in time, and also a very considerable one in expence: not having my designs yet in actual operation, I cannot at present show any practical results. At no distant time this shall be the subject of another paper. The system here alluded to I have in a forward state of preparation (it being, in my opinion, so well adapted for conveying help to land), also other matters for improving a deficient texture.

I beg to conclude this essay with some observations made

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* The strength and consequent value of all cattle-dung will of course depend upon the nature of their food: if soiled, during the summer, upon clovers, tares, sainfoin, &c. &c., there can be no doubt that the manure will have a proportionately greater effect upon the land than if the beasts be kept in the straw-yard; and, if stall-fed, either in winter or summer, for the purpose of fatting, it will be still better. Thus it was found, on comparing the effects of dung voided by animals fed chiefly on oil-cake with that of store-stock, 12 loads of the former exceeded in superiority of product 24 of the latter.—See 'The Complete Grazier,' sixth edit., p. 103.—F. Burke.

on a former occasion.—No amelioration connected with the rural art is of more lasting importance than correcting the constitutional defects of a soil. The best horticulturists and market-gardeners are many of them, perhaps, unacquainted with the theory, yet perfectly understand the great results from that practice; and in this particular information they are all of them superior to many practical farmers. How often do we see a stiff soil sterile in a great degree from that cause only; yet in the vicinity of a sandpit and adjoining most bogs there is a considerable breadth of coherent land, which might be made double its present value by judicious and liberal top-dressings of peat, which is also unproductive from causes of a contrary nature! The present poverty of many extensive tracts of land is a manifest exhibition of the want of skill or enterprise of their owners and cultivators.

Hathershaw Lodge, near Oldham,
Lancashire, Feb. 1839.

XIII.—*On Wheel and Swing Ploughs.*—An Essay to which the Prize of Ten Sovereigns was awarded in July, 1839.—By HENRY HANDLEY, Esq., M.P.

In the award of merit between ploughs of various construction some difficulty arises, inasmuch as almost every farmer entertains a predilection for one or the other, which he probably uses exclusively, and to which alone his men are accustomed; and it is therefore seldom that the comparative advantages of different sorts can be fairly tested. To enable me to meet this difficulty, I have not only used both swing and wheel-ploughs on my own farms, but have seen them tried in different counties and soils; on clay, limestone, and sandy loam; in wet and dry weather; on clover-ley, stubbles, and fallows; across ridge and furrow, as well as on a level surface; and with skilful and unskilful ploughmen.

It is extremely improbable that, were the one implement in all respects and on all soils superior to the other, such a difference of opinion and practice should have thus long prevailed. It will, therefore, be found that, under certain circumstances, each may have its peculiar advantages. Thus Loudon observes—" Different soils, situations, and uses will, of course, require different kinds of ploughs, though there are undoubtedly some that are capable of a much more general application than others."

I ought to premise that, residing in a county where swing-ploughs are almost invariably used, my predilection has certainly been in favour of that implement; if, therefore, in balancing the advantages and disadvantages of both, I decide in favour of ploughs with

wheels, it is the result of conviction based upon a series of impartial, and I think conclusive, experiments.

I have understood the question to relate to the following ploughs, viz. :—

The *swing-plough*, by which I mean a plough the depth of which is regulated by the line of draught and controlling power of the man who holds it; and

The *wheel-plough*, the depth of which is controlled by two wheels, the one about 12 inches diameter, attached to the beam by a sliding shank and socket on the land side of it,—the other about 20 inches diameter, attached to the furrow side of the beam.

The plough is, mechanically speaking, a portion of a screw or curved wedge forced forward horizontally, with which, in the first instance, the surface of the soil is cleft to a certain depth and width, while the wing or mould-board is so constructed as to lift and deposit the separated portion at a given angle.

The implement which effects these operations with the least power and cost under ordinary circumstances, and which is at the same time most capable of control, I conceive deserves the preference.

The first consideration is the comparative draught requisite to overcome a given resistance, and to execute a given amount of work.

In this primary point, I find that writers on the subject have estimated wheel-ploughs to require a greater power of draught. In theory it might seem that the addition of wheels would add to the draught, but, taking into account the uniform gauge and other circumstances which occur in practice, a different conclusion may be come to, as I shall endeavour presently to show.

As regards the cause of the diminished force required by the wheel, compared with the swing-plough, it appears to me to be principally, if not fully, explained by the more uniform horizontal motion communicated to the share and sole of the former through the regulating medium of the wheels at the fore-part of the beam, which diminish the shocks arising from the continual vibrations of the implement when balanced between the hand of the ploughman and the back and shoulders of the horse. It is not contended that wheels so situated act the part of lessening the friction between the sole and the soil; but they keep the rubbing part more truly to its depth, and maintain its horizontal action more correctly; whereas the horses affect a swing-plough at every step by the irregularity of their proper movement, which has to be counteracted by the effort of the man at the opposite end. Thus conflicting forces are momentarily produced, and continual elevations and depressions of the point of the share take place, together with deviations from the flat position of the sole,

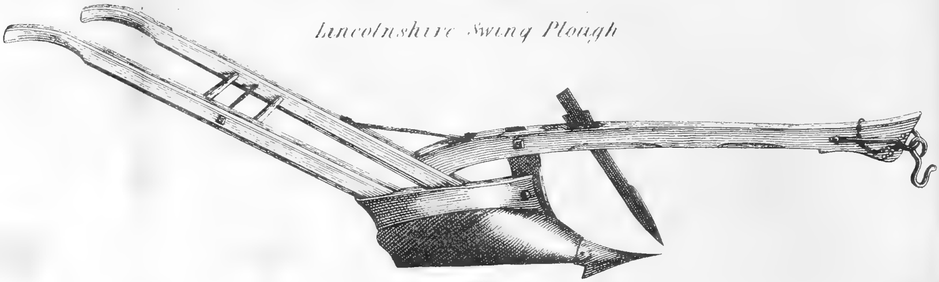
which should be retained at right angles to the perpendicular; and to remedy which, unskilful ploughmen bear unequally on the stilts, which produces a lateral pressure landwards, and consequently a great amount of friction along the whole of the left-side plane of the plough. However small may be the efforts of the ploughman to keep his plough "*swimming fair,*" those efforts must be attended with increased resistance, and consequently with increased exertion of the horses.

It is not pretended that in a wheel-plough none of these irregularities of motion exist; on the contrary, the dynamometer shows them to be very considerable, but less in degree than in the swing-plough. The oscillations of the index of a dynamometer are, as might be expected, very great when applied to a plough. The point of a ploughshare may be readily supposed, at one instant, to have burst a sod, which, opening and being raised upwards, offers for several inches but a trifling resistance to its progress; it again meets the obstacle, which is again overcome. It is similar with roots, stones, and other varying impediments, and thus at every step of the horse (whose motion is also a series of impulses) the draught, as exhibited by the dynamometer, is continually and largely varying.

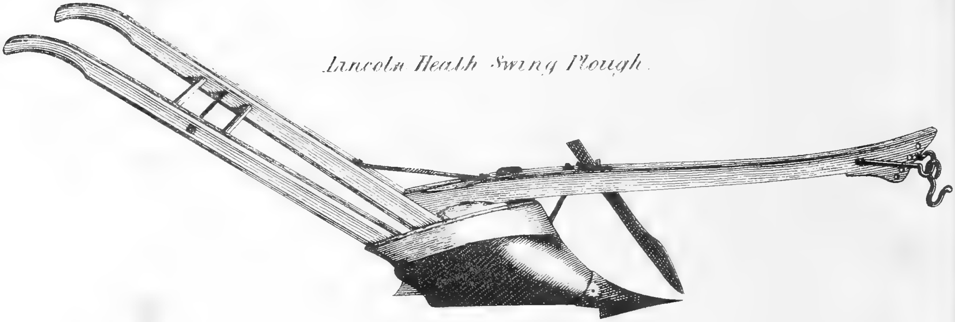
These are effects arising from the nature of animal force and of the soil; they are necessarily common to both ploughs, but appear to be augmented in the swing, compared with the wheel-plough, and sufficiently account for the diminished draught of the latter as shown in the Table of Experiments.

In order to satisfy myself more particularly as to the draught of ploughs, I requested the Messrs. Ransome, of Ipswich, who are the most extensive manufacturers of ploughs in the kingdom, to furnish me with the opportunity of ascertaining the fact in respect of those implements which they themselves had constructed. A stubble-field, of a sandy loam, was selected; partly up and down hill, and partly on a level. The ploughs, all by the same maker, were set to the same gauge, viz., furrows 6 inches deep and 10 wide, drawn by a pair of horses abreast, and held by the best men that could be procured, who were occasionally changed from one plough to another. The instrument employed to test them was a draught-dynamometer, on Regnier's principle, and which had previously been proved, by the suspension of weights, to register with accuracy. This dynamometer consists of two flat plates of steel, of a curved form, and increasing in thickness towards the ends, which unite into solid cylindrical loops, the curved sides of the plates being placed opposite to each other, and the whole forming an entire elliptic spring. On the application of this instrument as a *link* in the line of draught, the oval becomes lengthened in proportion to the degree of force acting on the loops

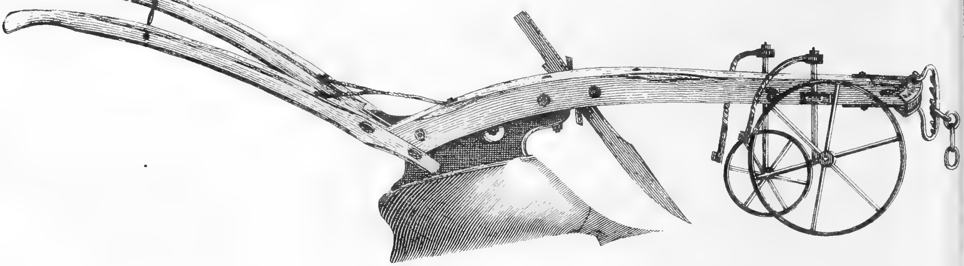
Lincolnshire Swing Plough



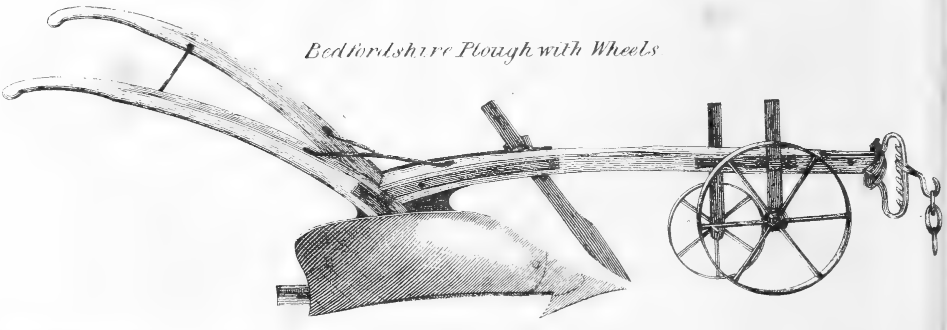
Lincoln Heath Swing Plough.

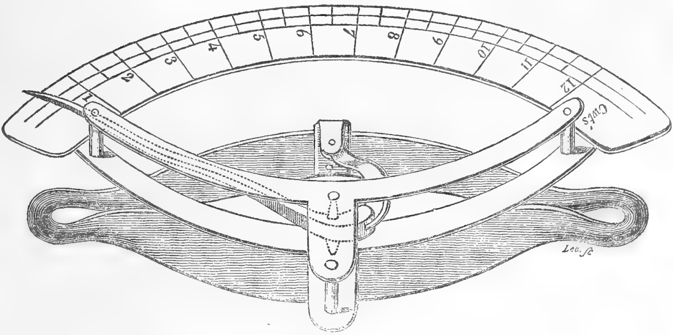


Rutland Plough with Wheels



Bedfordshire Plough with Wheels.





in opposite directions, and the curved sides approach more nearly towards each other accordingly. This degree of approximation in the plates is shown on the scale, in divisions corresponding to half and whole hundred-weights, by means of a cross-rod secured to one plate acting on a crank attached to the opposite one; thus communicating its effect to the lever-index, which, moving over the divisions of the scale, marks the varying degree of force exerted at each moment by the draught to which the instrument is subjected. The index was marked down every few yards, at moments when its oscillation was steady and the draught uniform, and the mean of the whole then taken. The length of the field and back was the trial in each case. It was observed that the inclination or declination of ground made very trifling differencė, owing, probably, to the position of the horses acting upon the beam at an inverse angle.

Ploughs tried at Ipswich, November, 1838.

Description of Ploughs.	Maker and Mark.	Weight of each Plough.			Draught.		
		cwt.	qrs.	lbs.	cwt.	qrs.	lbs.
Rutland, with Wheels . .	Ransome. N. L.	1	3	22	2	1	21
Bedfordshire, with Wheels	Ransome. L. L.	1	3	26	2	3	24
Lincolnshire Swing . .	White, with Ransome's Irons. B. M.	1	0	18	3	0	0
Lincoln Heath	Ditto. L. H.	1	1	1	3	0	11

In the foregoing experiments it will be observed, so far from the wheel-ploughs requiring more power, the Rutland and Bedford, as compared with the Lincolnshire swing-ploughs (which are acknowledged to be excellent of their kind, and but little varying from the Scotch), actually required less; and I cannot but remark that, although the ploughing with each of the implements was admirably well done, yet there was a manifest neatness and regularity about the work done by the ploughs with wheels over that of the swing-ploughs; for the land-wheel acts as a lateral gauge to the width of each furrow, as well as to the depth, and therefore the uniformity of width, depth, and angle of the furrow-slice thus produced gave a perfect form to the whole operation. A further fact was established, namely, that the draught of the plough is not increased in an equal ratio with the weight; for on loading the Rutland plough with 112 lbs., or 51 per cent., additional weight, the draught was only increased 33 lbs., or 12 per cent.

The foregoing results have been borne out in a greater or less degree by subsequent experiments on land of greater tenacity, and under different circumstances; and even in the case of a swing-plough, to which wheels were temporarily attached for the occasion, and tried on an adjoining furrow, the draught was proved to be diminished, although the plough was not originally constructed as a wheel-plough, and consequently, from its length of beam and differently-poised bearings, worked under a manifest disadvantage.

The experiments exhibit the *wheel*-plough as requiring a smaller amount of animal exertion than the *swing*-plough; indeed, the tractive force of the Rutland wheel-plough appears, by the table, to have been less than that of the best experiment of the Lincolnshire swing-plough by 23 per cent.; and which is, I think, to be accounted for in the way I have before noticed. A second property of the wheel-plough—viz., that it demands less skill in the ploughman—is on all hands acknowledged; and that it performs its work equally well with the swing-plough is not, I believe, denied by the admirers of the latter implement. I cannot but consider the fact of the wheel-plough demanding less skill in the ploughman to be a considerable advantage on its side, though it receives but little favour amongst first-rate swing-ploughmen, who are accustomed to estimate highly their own manual dexterity, from the circumstance of the quality of their work depending on dexterity alone. Undoubtedly there are many men will make as good work with a swing as with a wheel-plough; but, if we take a district (and it need not be a large one) in which a hundred ploughmen are required, it is more than probable that not ten such will be found. This of itself appears

to me to be a strong argument in favour of the wheel-ploughs. It has been objected that they create a nursery of bad ploughmen, inasmuch as it is in the power of any one to make a good furrow with a wheel-plough, while it tests the abilities of the man to produce the same effect with a swing-plough. When, however, it is called to mind that boys can be instructed at an earlier age in the use of the plough, and enabled to come into better earnings, than they could do otherwise, as well as that a boy at 10*d.* per diem wages may benefit his master by making as good work with the one implement as a man at 2*s.* can execute with the other; and that the advantage shall be attained of an even furrow throughout the field, rarely effected by a gang of swing-ploughs, with depth, width, and angle of inclination, performed with almost mathematical precision; thereby producing an unvarying bed for the seed, and a regular edge for the harrows; the advantage of the wheel-plough can scarcely be estimated too highly, and marks a decided preference.

In Scotland, indeed, the wheel-plough is not approved; and in some parts of the country, where, 30 years ago, it was in use, it has been discontinued, having fallen into disrepute by the supposed friction of the wheels. It must, however, be observed, that at that period, and in Scotland at the present day, the *wrought-iron share* was the only one used. If then we intrust the depth and breadth of the furrow-slice to the wheels, we must take care that the share and coulter do not operate as conflicting forces. If the blacksmith be not extremely careful in laying the share, he may set the point too low, so as by its inclined direction to occasion an excess of pressure upon the wheels, which must proceed horizontally; or, if the point incline a trifle too much to land, or to the contrary side, a counter effort is produced, which tends greatly to increase the draught. This is, however, remedied by the practice of *casting the share,* which must necessarily be alike in shape; and the improved system of case-hardening them on the under side, as invented by the Messrs. Ransome, remedies the evil of wearing thick, to which cast-iron shares were subject when first introduced: and the dynamometer shows that this most important improvement of modern days has had the desirable effect of reducing the draught; to say nothing of avoiding the interminable necessity of sending almost every evening to the blacksmith's shop, to have the shares relaid or sharpened.

I may here mention, in estimating the value of a good swing-ploughman, especially as connected with draught, that in one of my trials I substituted for a first-rate ploughman one who, though no novice, was decidedly his inferior, and who held the same plough for a *bout,* during which he exerted his best abilities, aware of the comparison about to be instituted, and yet the draught

was, in his hands, increased *six per cent.*, and I have no doubt, had he continued to hold the plough for an entire day, it would have been considerably more. This man, though inferior to the other, possessed skill above the average of ploughmen usually employed. Had he held a plough with wheels, there would, probably, have been no difference in the draught between the holding of the plough by himself and predecessor.

In land rendered hard by draught, or stubborn from other causes, I have found the bite of the wheel-plough effective, where the swing-plough could not, without great difficulty, be held in its work;* but of course in the former case the share was set sharp into the ground, and the draught-chain at the highest notch of the hake, which made a heavy pressure upon the wheels. I simply remark on this to show that the wheel-plough is sometimes applicable to hard work, where the swing-plough will not do so well.

On the other hand, there are cases to which the swing-plough is more applicable: I would instance an unequal surface, as on the Wolds of Yorkshire, where the rock lies at varying depths, sometimes within three or four inches of the surface, at others at a greater depth, and where the swing-plough, in skilful hands, may be more readily accommodated to the case. In cross-cutting dead fallows, where the surface is rough and hard clods interrupt the even action of the wheels, they would be better dispensed with. In wet weather on strong land (though I conceive as a general rule it would be better not to work it at all in that state) the wheels are apt to clog, although that inconvenience is materially diminished by the scraper attached to the best constructed ploughs.

In crossing steep ridge and furrow the action of the ascending wheels raises the share out of the furrow, while in descending it plunges it deeper into the ridge. This, however, occurs only in extreme cases, and, to a considerable degree, the same effect attends the swing-plough, unless carefully managed.

As the wheel-plough more particularly treated of in this Essay is, with the exception of the wheels, the same in construction as the swing-plough, *it may be used either with or without wheels, as circumstances require.*

The expense of the implement is undoubtedly in favour of the swing-plough, but the prime cost is matter of comparatively little moment when other circumstances are considered. My experi-

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* I have witnessed this upon some very stubborn clay, in which a Kentish turn-wrist did its work well; while a Scottish swing-plough, though held by a very expert fellow, could not be made to keep a regular furrow. The labour was also evidently greater to the ploughman who worked the latter; and the horses appeared to me more distressed than those in the turn-wrist.—F. BURKE.

ments have been chiefly confined to the ploughs described in the former part of this Essay.

Of the Suffolk and Norfolk wheel-ploughs on high wheels and gallowses, adapted as they may be to light soils, they are necessarily cumbersome, and constructed with so many conflicting forces that much depends on the skill of the ploughman to adjust them. I have noticed that it is continually necessary to raise or deepen the gallows, which require alteration, on taking out or setting in, each furrow, with beam-bolts, &c., regulating the action to and from land, and consuming much time in their repeated adjustment.

The Kentish ploughs are on a somewhat similar construction, with high gallowses and wheels, but larger and stronger than the before-mentioned: these are said to be necessary to resist the heavy stònes which they continually encounter. They are confined to their respective localities. While it is questionable whether they will be much longer retained there, it is certain they will not become general in other parts.

The facts detailed in this paper are founded on practical and careful experiment. The result arrived at in my own judgment is forced upon me by conviction, and I have only to add that I shall be equally open to the influence of opposing facts, if founded upon actual and well-attested experiment.

XIV.—*Account of Liquid Manure.*—An Essay to which the Prize of Ten Sovereigns was awarded in July, 1839.—By Cuthbert W. Johnson, Esq., of Gray's Inn, Barrister-at-Law.

Liquid manure, the subject of our Society's premium, is not a mode of fertilizing the land altogether of modern origin, for a fermented mixture of water and night-soil has, from a very early period, been employed by the Chinese farmers; those of Italy certainly practised irrigation in the days of Virgil (Georgics, book i., v. 106-9), and Cato adds that they employed a mixture of grape-stones and water to fertilize their olive-trees (book xxxvii.). Columella praises very highly the use of putrid stale urine for vines and apple-trees (book ii., c. 15), commending also the lees of oil for the same purpose. More modern agricultural authors have united in praising various liquid preparations; thus Evelyn (whose ingredients most of the authors recommend), in his Treatise on Earth (p. 123-60), gives several recipes, some of which have served as the basis for recent modes of preparing liquid manure, such as the dung of cattle, urine, *salt and lime,* and nitre. Of these artificial mixtures, salt one part, and lime two parts, mixed together and allowed to remain in a heap for two or three months

(Mr. Bennett turns it over three or four times in this period), is fully equal, if not superior, to any thus recommended, most of which I have tried. When mixed with water and spread over land intended for wheat, at the rate of from 25 to 35 bushels of the salt and lime to 10 or 15 tons of water per acre (and it answers very nearly as well when carried on the land dry), excellent results are produced. The wheat which I have thus grown on clover-leys has been superior, in height and strength of straw, to any I have seen produced under different modes of treatment, and the seed very bright and heavy.

All substances, whether organic, earthy, or saline, which are employed to fertilize the soil, or become the food of plants, can only be rendered thus serviceable to vegetation when they are presented to the roots of plants in solution, or in a fluid state; and although this may appear at first rather a sweeping position, yet such is the real fact, the compost of the farm-yard, the crushed bones of the turnip cultivator, the oil and bones of fish, the gypsum of the grazier, the earths, lime, magnesia, and even silica, and all the saline manures, are dissolved by some process or other before they can be absorbed by vegetables. Every attempt which has been hitherto made to make plants imbibe the most minutely divided powders which chemistry can produce, has been entirely fruitless. Davy ineffectually tried the finest impalpable powder of charcoal, and with much perseverance I have fruitlessly employed the earths, saline substances, and organic matters, for the same purpose.

This absolute necessity for every substance which is the food of plants being of a soluble nature did not escape the sagacity of the early Greek and Egyptian philosophers; it is true they carried their conclusions with regard to subjects of natural philosophy too far, as in this instance, when they asserted that water is the only food of plants; yet they must have patiently noticed many facts in vegetable economy, unaided as they were by the light of modern vegetable chemistry, before they could have arrived at a conclusion so nearly approaching the truth. The idea was probably of Egyptian origin, for the cultivators of that country could not fail to notice the magic fertilizing powers of the waters of the Nile, whose annual overflow is perhaps the most extensive natural irrigation taken advantage of by the cultivators of the earth.

The same wild dream of water being the sole food of vegetables was again revived, so lately as 1610, by M. Van Helmont, a celebrated Dutch chemist, who made some very plausible, deceptive experiments on a willow-tree, which he watered only with rain water; researches, however, whose inaccuracy (owing principally to rain-water, as usually collected, not being quite pure) was shown in 1691, by Mr. Woodward. Although, therefore, it is

now well ascertained that water is not the only food of plants, yet it certainly contributes universally and largely to their support; and, as it has been well observed by Davy, no manure can be taken up by the roots of plants unless water is present; and water, or its elements, exists in all the products of vegetation.*

It must not, however, be concluded that these carefully considered conclusions, from the results of often-repeated laborious experiments, are erroneous, because transparent water, *apparently* pure, as in water-glasses, or in irrigation, promotes the growth of bulbs, grass, &c., since the very purest spring-water, even rain-water, contains foreign substances, as I have clearly ascertained by experiment; and when only chemically pure water is employed to water plants, they cannot be made to flourish. I have fruitlessly varied the attempt in several ways. All the experiments of Dr. Thomson were equally unsuccessful, the plants vegetating only for a certain time, and never perfecting their seeds. Similar experiments were made by Hassenfratz and Saussure, and others, with the same unfavourable result. Duhamel found that an oak which he had raised from an acorn, in common water, made less and less progress every year. The florist is well aware that bulbous roots, such as hyacinths, tulips, &c., which are made to grow in water, unless they are planted in the earth every other year, at first refuse to flower, and finally even to vegetate. Moreover, it has been unanswerably shown by many very accurate experiments,† at the varied repetition of which I have personally assisted, that the quantity of nourishment or solid matters absorbed by the roots of plants is always in proportion to the impurity of the water with which they are nourished; thus some beans were made to vegetate under three different circumstances: the first were grown in distilled water; the second were placed in sand and watered with rain-water; the third were sown in garden-mould. The plants thus produced, when accurately analyzed, were found to yield the following proportions of ashes:—

1. Those fed by distilled water . .	3.9
2. Those fed by rain-water . . .	7.5
3. Those grown in soil . . .	12.0

And again all attempts to make plants flourish in the pure earths have failed utterly when they have been watered with pure water; yet a totally different result I have invariably experienced when I have employed an impure solution or liquid manure. My trials have been entirely supported by those of M. Giobert, who, having formed of the four earths, silica, alumina, lime, and magnesia, a soil in the most fertile proportion, in vain essayed to make the

* Lecture 15.

† Rech. sur la Vég., 51.

plants flourish in it when watered with pure water only; but every difficulty was removed when he moistened it with the water from a dunghill, for they then grew most luxuriantly; and M. Lampadius still further demonstrated the powers of such a foul liquid manure, for he formed plots composed of only a *single earth*, pure lime, pure alumina, pure silica, and planted in each different vegetables, watering them with the liquid drainings from a dunghill, and he found that they all flourished equally well. The soluble matters of a soil ever constitute, in fact, its most fertilizing portion; and if by any artificial means the richest mould is deprived of these, as by repeated washings in cold or boiling water, the residuum, or remaining solid matter is rendered nearly sterile: this fact, first accurately demonstrated by M. Saussure,* I have since confirmed by a variety of experiments of my own.

The soluble matters or liquid manures consumed by plants are sometimes imbibed by their roots unaltered,—in other cases they are decomposed during their absorption. The earths, gypsum and other salts, are instances of the first class; oil, and other purely animal matters, of the last. Davy found that some plants of mint which he forced to vegetate in sugar and water, apparently absorbed the sugar unaltered, for they yielded a considerably larger proportion of a sweetish vegetable extract than those of the same weight which he had grown in common water; and it is an ascertained fact that the roots of plants will absorb or reject the various earthy substances of a soil, or even when placed in a saline solution, in a very remarkable manner; thus, when equal parts of gum and sugar were dissolved together in water, and some perfect plants of polygonum persicaria placed with their roots in the solution, it was found that they absorbed thirty-six parts of the sugar, but only twenty-six of the gum; and when in precisely the same proportions and manner Glauber salt, common salt, and acetate of lime were used, then it was found that the roots of the persecaria separated these salts from the solution with much ease, absorbing 6 parts of the Glauber salt, 10 parts of the common salt, but not a trace of the acetate of lime.†

These facts will not be uninteresting to the irrigators or occupiers of the English water-meadows, since they may in some degree serve to account for the beneficial action of water on such lands—a question not nearly so well understood as it ought to be, and on which widely differing opinions are commonly held by practical farmers. It is a theme intimately connected with the subject of this paper, for irrigation is, in truth, a mode of applying the weakest of liquid manures, on a very bold scale, to grass-lands.

* Rech. 150. † Thomson, vol. iv. p. 321.

Almost every farmer has a mode of accounting for the highly fertilizing effects of irrigation. Davy added another to the list of explanations. He thought that a winter-flooding protected the grass from the injurious effects of frost; he examined with a thermometer, and with his usual address, the water-meadows near Hungerford in Berkshire, and ascertained that the temperature of the soil was ten degrees higher than the surface of the water, and that too on a frosty March morning. He remarked, also, a fact that most farmers will confirm, that those waters which breed the best fish are ever the bēst fitted for watering meadows.*

Such were the opinions of Davy as to the fertilizing properties of water. It is to be lamented that the agricultural opportunities for observation of this great chemist were so few, for his valuable remarks were always cautiously made. He appears, however, never to have steadily investigated the chemical composition of river-water, with regard to its uses in irrigation, and in consequence he knew little of the value of some of its impurities to vegetation. Thus, if the river-water contains gypsum (sulphate of lime), which it certainly does if the water is *hard*, it must, under ordinary circumstances, on this account alone, be highly fertilizing to meadows, since the grasses contain this salt in very sensible proportions. Calculating that one part of sulphate of lime is contained in every two thousand parts of the river-water, and that every square yard of dry meadow-soil absorbs only eight gallons of water, then it will be found that by every flooding more than one hundred-weight and a half of gypsum per acre is diffused through the soil in the water, a quantity equal to that generally adopted by those who spread gypsum on their clover, lucern, and sainfoin crops as a manure, either in a state of powder, or as it exists in peat-ashes.

And if we apply the same calculation to the organic substances ever more or less contained in flood waters, and if we allow only twenty-five parts of animal and vegetable remains to be present in a thousand parts of river-water, then we shall find, taking the same data, that every soaking with such water will add to the meadow nearly two tons per acre of animal and vegetable matters, which, allowing in the case of water-meadows five floodings per annum, is equal to a yearly application of ten tons of organic matter. The quantity of foreign substances present in river-water, although commonly less, yet very often exceeds what I have calculated to exist.

I have found it impossible to give from analysis the amount of the foreign substances, under ordinary circumstances, present in river-waters, with any tolerable accuracy, since the proportion not

* Agricultural Chem. p. 352.

only varies at different seasons of the year, but a considerable proportion of the merely mechanically suspended matters invariably subsides when the specimen water is suffered to rest, so that the chemical analysis is in fact merely that of those portions in chemical combination: to give an instance of this, Thames water usually contains from 1 to 2 per cent. of mechanically suspended matters; yet, when this water was analysed by Dr. Bostock, 10,000 parts were found to contain only about $1\frac{3}{4}$ parts, namely,

Organic matters	0·07	parts
Carbonate of lime (chalk)	1·53	„
Sulphate of lime (gypsum)	0·15	„
Muriate of soda (common salt)	0·02	„

And in the same quantity of the water of the Clyde, Dr. Thomson found only a little less than $1\frac{1}{3}$ part, namely,

Common salt	0·369	parts
Muriate of magnesia	0·305	„
Sulphate of soda (Glauber salt)	0·114	„
Carbonate of lime (chalk)	0·394	„
Silica (flint-earth)	0·118	„

There is no stream more celebrated for its prolific water-meadows than the Itchen, in Hampshire; and in no part of England is the system of irrigation better understood and more zealously followed. I have several times examined the water of this river, taken from above the city of Winchester: it contains in 10,000 parts, after all its mechanically suspended matters have subsided, about $2\frac{2}{3}$ parts, namely,

Organic matter	0.02	parts
Carbonate of lime (chalk)	1·89	„
Sulphate of lime (gypsum)	0·72	„
Muriate of soda (common salt)	0·01	„

The water of lakes is usually still more surcharged with foreign substances than those of rivers; and from the use of such waters, especially if an occasional or winter stream of water passes through them, I have witnessed great fertilizing effects produced on meadow-land.

In my conclusions with regard to the theory of irrigation, I have found many able practical farmers concur. Thus, Mr. Simmonds, of St. Croix, near Winchester, considers that the great benefit of winter-flooding for meadows is derived, in the first place, from the deposits made by the muddy waters on the grass; and, secondly, from the water covering the grass, and preventing the ill effects arising in the winter from the sudden transitions in the temperature of the atmosphere. This gentleman is perfectly

aware of the value of the addition of the city drainage of Winchester to the fertilizing qualities of the Itchen river-water, and of its superiority for irrigation after it has flowed past the city, having water-meadows both above and below the town; and he finds that, if the water has been once used for irrigations, that then its fertilizing properties are so materially reduced that it is of little value for again passing over a meadow; and so convinced is he of this fact, by long experience, that, having in this way long enjoyed the exclusive and valuable use of a branch of the waters of the Itchen for some grass-land, a neighbour higher up the stream followed his example, constructing some water-meadows, and using the water before it arrived at those of my informant, who, in consequence, found the water so deteriorated in quality (though not sensibly diminished in quantity), that he had once thoughts of disputing the right with his more upland neighbour.

The employment of artificially-prepared liquid manure (though little known at present in England) is very extensive on the Continent: the Swiss farmers call it *gulle;* in France it is denominated *lizier;* and by the Germans, *mist-wasser.* They prepare it throughout many of the German states, and in the Netherlands, by sweeping the excrements of their stall-fed cattle into underground reservoirs, mixing with it four or five times its bulk of water, according to the richness of the dung: five reservoirs are generally employed, of such a size that they each take a week to fill; and thus each has four weeks allowed to ferment before the mass, which in this time becomes of an uniform consistence, is removed, by means of a portable pump, in water-carts, or large open vessels. A similar plan is adopted in the north of Italy, and from time out of mind has been practised by the Chinese. In that empire, however, the cultivators chiefly employ night-soil, which is made into cakes for this purpose with lime or clay, in all their large cities, to prepare their liquid manure.

It is from long experience, an admitted fact among the German farmers, that there are no manures so powerful in their operation as those which are liquids, such as human urine or bullocks' blood; so that no English farmer need fear deception as to their asserted value. This very fact was submitted some years since to the consideration of Professor Hembstadt, of Berlin, by the Saxon and Prussian authorities, who were anxious to apply the contents of the city drains towards fertilizing the barren lands in the neighbourhood of Dresden and Berlin. This talented agriculturist undertook, in consequence, a series of valuable experiments, which, varied in every possible way, were carried on for a considerable period; the result of them, so highly advantageous to the prosperity of Germany, Hembstadt then published. They were repeated with

unvaried success by Professor Schübler, and the results may be stated in the following order.

If the soil, without any manure, yield a produce of three times the quantity of seed originally sown, then the same quantity of land will produce—

5 times the quantity of seed sown, when dressed with old herbage, grass, leaves, &c.
7 times, when dressed with cow dung.
9 times, with pigeons' dung.
10 times, with horse dung.
12 times, with *human urine.*
12 times, with *sheep's dung.*
14 times, with human manure, or *bullocks' blood.*

Thus, it will be seen, that, of seven usually employed fertilizers, the liquid manures, urine and blood, were found to be decidedly the most powerful.

Both with regard to the quantity of liquid manure applied per acre, and the mode of spreading it, much must depend upon the circumstances under which the cultivator is placed, and the richness of the liquid he employs. If the impurities dissolved, or mechanically suspended in the water, are equal to 1 part in 10, then 20 to 30 tons per acre of the liquid manure I have found amply sufficient, under ordinary circumstances, to produce the most excellent results; if the fluid mass is purer, then more must be applied. For gardens, and small plots of ground in general, the liquid may be readily and evenly distributed over the beds by means of a watering-pot or garden-engine; for fields it must be carried in water-carts, and distributed either by being let into a transverse trough, pierced with holes in the manner of those employed for street-waterings, or the Flemish plan may be adopted, (especially when the manure is of too considerable a thickness to flow readily through holes) of taking it into the fields in the water-carts, open at the top, (furnished with slight moveable covers,) and then distributing it out of the cart very evenly by means of a scoop; and I have invariably perceived the advantage of ploughing the liquid into the soil *as soon after it was spread on the land as possible.* The cultivator will find great advantage if he uses the garden-engine, watering-pot, or cart, from straining the liquid manure, before he pumps it out of the reservoir, either through straw, coarse sand, or a basket; the pieces of straw, and other coarsely divided-matters thus separated by the strainer, he will discover add very slightly to the fertilizing powers of the liquid, and yet they all materially hinder the even distribution of the manure.

The expence, per acre, of such an application of liquid manure, I thus estimate, supposing the cow-herd to be employed :—

	£.	s.	d.
Three tons of cow or other fresh dung . .	0	18	0
Labour in mixing and occasionally stirring it with from 20 to 25 tons of water . . .	0	2	0
Carting, and spreading it on the field . .	0	8	0
	£1	8	0

If it shall occur to the farmer, that the quantity of solid manure thus added to the soil will not, in reality, much exceed two tons per acre, and that this is, in appearance, a very small allowance, I would remind him, that the quantity thus conveyed consists of the soluble or richest portion of the manure, and is, in fact, the extract without any of the straw, or other inert residuum usually carried on to the soil; besides, it is a very erroneous, though common conclusion, that to produce fertility a manure must be used in large quantities. I have observed in this paper, that a flooding with river water, so productive of heavy crops of grass in the water meadows, does not carry on to the land more than two tons per acre of animal and vegetable substances; and, in the successful experiments of the late Lord Somerville, at Fairmile, with whale blubber, not more than a ton and a half per acre were applied. The Essex farmers find three-quarters of a ton of sprats amply sufficient; and two cwt. per acre of gypsum is the ordinary successful allowance for grass land. The exact evenness, therefore, with which a manure is spread over the land is a highly important consideration as regards the economy of manures. There is no commonly cultivated plant which more delights in liquid manure than the potato. It naturally luxuriates near to wet ditches: on plots which have received the drainage of a dunghill it grows with the greatest rapidity. I have invariably found that, to any liquid mixture intended as a manure for potatoes, the addition of five or six bushels of salt per acre is productive of great good, both as regards the quantity and quality of the potatoes.

On clover leys intended for wheat, the liquid should be turned into the soil as early as possible after it is spread; and if this operation is performed in moist cloudy weather, a very material advantage will be perceptible in the succeeding crop. The warmth of the sun is certainly prejudicial to the thinly-spread liquid manure, composed of finely-divided animal and vegetable substances.

Of the tanks for receiving or preparing the liquid manure, I may remark that I have always found them best made of flints or

bricks set in good mortar or Parker's cement;* they may be *bedded* in clay, but I would not advise the use of clay for the brickwork, since worms are sure eventually to penetrate through it; and I advise the shape to be something like a decanter, larger at the top than at the bottom, in the manner introduced at Eastbourne, and in Cornwall, chiefly by the advice of Mr. Davies Gilbert.

To the presence of a large proportion of urine, the richest of liquid fertilizers, must be chiefly attributed the luxuriant effects produced by the liquid manure, as prepared on the Continent, and from the use of the sewerage matters of large towns, as so strikingly proved in the case of the Craigintinny water-meadows, near Edinburgh, where the drainage is employed in the state in which it issues from the sewers, and from whose use several crops of the most luxuriant grass are annually obtained. "All urine," said a late distinguished chemical philosopher, "contains the essential elements of vegetables in a state of solution." By a careful analysis, the human variety of this fluid, in its fresh state, was found, by Berzelius, to contain the following substances:—

Water	93·300
Urea (the peculiar animal matter of urine)	3·010
Sulphate of Potash	0·371
Sulphate of Soda	0·316
Phosphate of Soda	0·294
Common Salt	0·445
Phosphate of Ammonia	0·165
Muriate of Ammonia	0·150
Lactate or Acetate of Ammonia Lactic or Acetic Acid Animal matter, soluble in Alcohol Inseparable Urea	1·714
Earthy Phosphate (Earth of Bones) with Fluate of Lime	0·100
Uric Acid	0·100
Mucus of the Bladder	0·032
Silica (Earth of Flint)	0·003
	100

Thus it will be seen that there is hardly a single ingredient found in urine which is not either a direct food for vegetation, or furnishes by its decomposition a supply in another form; for in it are thus detected the ammoniacal salts of the dunghill, the phosphate

* See 'Flemish Husbandry:' by the Rev. W. L. Rham, M.A.—(Farmers Series, Library of Useful Knowledge.)

of lime of bones, as well as of many cultivated vegetables, and abundance of easily decomposable animal matters.*

The urine of the horse is nearly as rich in animo-vegetable matters; its composition, according to the experiments of Fourcroy and Vauquelin, is as follows:—

Water and Mucus	94·0
Urea	0·7
Carbonate of Lime (Chalk)	1·1
Carbonate of Soda	0·9
Benzoate of Soda	2·4
Muriate of Potash	0·9
	100

The following are the constituents in that of the cow, as found by Professor Brande:—

Water	65·0
Urea	4·0
Phosphate of Lime	3·0
Muriates of Potash and Ammonia	15·0
Sulphate of Potash	6·0
Carbonates of Potash and Ammonia	4·0
Loss	3·0
	100

It would appear, from some experiments of Dr. Belcher, that the ammoniacal salts of urine have a forcing or stimulating power which considerably hastens the vegetation of plants. His experiments were made with the common garden cress; and, in his trials, some plants nourished with a solution of phosphate of ammonia were fifteen days forwarder than plants growing under similar circumstances, but watered with plain water. In some experiments of Mr. Gregory, who watered half a grass field at Leyton with urine, the portion thus treated yielded nearly double the quantity of hay produced by the other unmanured portion; and the use of the urine of the cow, so extensively employed for grass lands, and in the garden and orchard, by Mr. Harley, in the neighbourhood of Glasgow, was attended with results equally satisfactory, producing, when diluted with water or

* The respective properties of animal urine depend much upon the nature of the food upon which the creatures are nourished; and its effects upon the land are consequently different: thus, it has been found weaker when taken from cows fed upon white turnips than upon Swedes, and still weaker from cut grass; while that produced in the distilleries is comparatively better than either of the former.—F. Burke. See Quart. Journ. of Agric., No. XIX. p. 96.

soap-suds, very superior crops of grass on land of a very inferior description.*

I shall conclude with a few observations on the loss which the cultivated lands of England incessantly sustain from the liquid manure of the sewers of her cities and large towns—a question to which I have before alluded in this paper, and which is not nearly so well understood as is desirable. Thus, by carefully conducted experiments and very accurate gaugings, it has been found that the chief London sewers convey daily into the Thames about 115,000 tons of mixed drainage, consisting, on an average computation, of 1 part of solid and 25 parts absolutely fluid matters; but if we only allow 1 part in 30 of this immense mass to be composed of solid substances, then we have the large quantity of more than 3800 tons of solid manure daily poured into the river from London alone, consisting principally of excrements, soot, and the debris of the London streets, which is chiefly carbonate of lime: thus, allowing 20 tons of this manure as a dressing for an acre of ground, there is evidently a quantity of solid manure, annually poured into the river, equal to fertilizing more than 50,000 acres of the poorest cultivated land! The quantity of food thus lost to the country by this heedless waste of manure is enormous; for, only allowing one crop of wheat to be raised on these 50,000 acres, that would be equal to the maintenance (calculating upon an average produce of 3 quarters of wheat per acre) of 150,000 persons. London, too, is only one huge instance of this thoughtless waste of the agricultural riches of the soil of England; from every other English city, every town, every hamlet, is hourly passing into the sea a proportionate waste of liquid manure; and I have only spoken of the solid or mechanically suspended matters of the sewerage; the absolutely fluid portion is still rich in urine, ammoniacal salts, soda, &c., when all the mechanically suspended matters have been separated from the other portion. According to very careful experiments this fluid part often contains 16 per cent. of animal matters, salts, &c., intimately or chemically combined with the water.

No farmer, after such an analysis of the sewerage of a large city, can feel surprised at the important results from the use of that sewer water, as long practised in the vicinity of Edinburgh. After learning the composition of such a foul mass—its endless mixture of organic matters—its soot—its carbonate of lime—and,

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* It appears, in some extensive experiments made in Scotland, not to have been successful upon arable crops; for, to wheat, sown upon clay-land, it did no good; to barley it was found injurious; potatoes were grown to a large size, but were watery and unfit for the table; and, on turnips, it was found not half so efficient as mere fermented dung.—F. Burke. Quart. Journ. of Agric. No. XIX.

above all, its urine, the forcing nature of the ammoniacal salts which that fluid contains, added to the presence of the other matters which are the food of plants, and the constant supply of such irrigation water in all seasons—he will readily give credence to the talented editor of the "Quarterly Journal of Agriculture," when he asserts that, by such treatment of the Edinburgh meadows with the sewerage irrigation, they have been increased in value several pounds per acre, yearly.*

I have often employed, with decided effect, in my own garden, for vines, peach and standard apple-trees, liquid manure, prepared either by mixing one part by weight of cow-dung with four parts of water, or the collected drainage of the stable and cowhouse. Of these the vine is by far the most benefited by the application; but to whatever fruit-tree the gardener has occasion to apply manure, there is no form so manageable and so grateful to the plant as the liquid. It has been found advantageous to plants cultivated in stoves to apply even a liquid manure, composed of six quarts of soot to a hogshead of water; and although this is a very unchemical mixture, yet it has been found by Mr. Robertson to be peculiarly grateful and nourishing to pines, causing them to assume an unusually deep healthy green; and for stoved mulberry, vine, peach, and other plants, the late Mr. Knight, of Downton, employed a liquid manure, composed of one part of the dung of domestic poultry, and four to ten parts of water, with the most excellent result—the trees maintaining, at the end of two years, "the most healthy and luxuriant appearance imaginable." †

In whatever way we view the question of liquid manure, to which our Society now directs the attention of the English farmers, an abundant field of research presents itself on every side: it is evidently an investigation likely to amply repay the cultivator for the labour he may be induced to bestow upon it. By such manures nourishment for vegetation is more equally diffused through the soil, and becomes more speedily serviceable to the crop, than by any other mode of cultivation. I have endeavoured, also, in this paper, to convince the farmer of what I have long remarked in my own practice—that a much smaller quantity of manure, if uniformly mixed with land, is sufficient for all the purposes of fertilization than is commonly believed. Such investigations must be of the highest interest to the farmer and to the public in general, for they relate to the increased produce of the land of England; and not only does a fortunate experiment carry with it its own reward, but even an unsuccessful one is not without its advantages—it serves, at least, as a beacon to other cultivators, and affords that satisfaction which ever accompanies the acquisition of knowledge.

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* Practical Irrigator. † Trans. Hort. Soc. v. ii. p. 127.

XV.—*On Drawing Turnips.*—An Essay to which the Prize of Ten Sovereigns was awarded in July, 1839.—By Richard Hopper, Esq.

The growing of turnips during the last sixty years has given a greatly increased value to the lighter soils in Great Britain. It has imparted also a new character to agriculture itself. The Society can, therefore, scarcely confer a greater favour on the cultivators of land, than by bringing under their consideration the various modes of management applicable to this valuable root, both as to its growth, and as to its consumption.

Although an inquiry in regard to the best mode of cultivating the turnip is not included in the several questions to which the attention of the competitors is directed, yet this Essay might appear incomplete, did it not premise that much of the advantage to be derived from the growing of turnips will depend upon the particular mode of their cultivation. Nor must this matter be overlooked in connexion with the " drawing and carrying away " of the crop; because the facility of that work will, in a great measure, depend upon the plan which has been adopted in its growth. If, however, the land require cleaning or pulverizing; if the farmer seek after a quick growth, and comparative security against the ravages of the fly; or, if he would provide the means for drawing and carrying off the produce, without injury to the land, or to his future crops;—he will find all these objects attainable by the making of ridges at 27 inches' distance, so as to admit the wheels of a cart in the spaces beyond 2 rows of plants. This space will, moreover, be found to be rightly adapted for the ready and unequalled operation of the horse-hoeing system.

The first inquiry as to the " best mode of drawing and carrying turnips, both from light and heavy soils," makes no distinction whatever as to the different modes of cultivation. If the old, broad-cast plan be retained, no mode of drawing and carrying off can be suggested which will not be injurious on every description of land, whether light or heavy. On that plan, even should the crop be only partly drawn off, the plants must be exposed to damage from their irregular position, as well as by the treading of the horse. Were the crop sown on ridges, at the distance as above named, the cart would proceed in the spaces between the ridges, without damage to the plants or inconvenience to the work. Taking for granted, however, that the old broad-cast plan of sowing were to be followed, the best mode of drawing and carrying away would be, by drawing the turnips on the half of two lands, from the furrow to the ridges; then laying them in proper heaps on each side; and, at last, by taking a cart down the furrow, for the purpose of the several heaps being loaded and carried away.

Whether the crop be only drawn off in part, or whether it be entirely carried away, the plan now proposed will, it is thought, be the best mode which, under the circumstances, can be adopted, either in reference to light soils, or to those of a heavier character.

The next subject refers to "the means of avoiding injury to the future crops from cutting up the land in carting, more particularly in clay soils." This injury cannot be more effectually prevented than by adopting the mode of drawing and carrying away, as just proposed. Were the ridging system, however, to be adopted—which every good farmer will, as far as practicable, put into use—the evil referred to might be entirely prevented. I might, therefore, answer this inquiry by saying, that the best means of avoiding any injury, both to the crop of turnips and to those which succeed, would be, by putting into practice the system of ridges at proper distances. The operations of hoeing and weeding, and then those to follow, by the cutter and the mould-board plough, having entirely disencumbered the plants of all weeds, turned up the soil to the ridges, and deepened also, sufficiently, the spaces between them, no damage whatever need be apprehended, either by the wheels of the cart or the movement of the horse. Indeed, the work of carting and carrying, under this system, may be the means of destroying any small remaining weeds of sudden growth in the spaces; and, by the raising of the soil up to the ridges, it will not only offer an opportunity for the crop being thoroughly cleaned, but the soil having been often worked over, and exposed to the action of the weather, it will arrive at that mellow, pulverized state which is necessary to the securing of a future crop.

We now proceed to consider "the best mode of supplying the loss of manure, arising by the turnips not being consumed on the land." The best application of manure for the purpose of providing food for the coming plant consists, in not only providing a proper distribution of the stimulus, but in applying it also in such a mode as that the greatest portion of it shall be placed within reach of the plants, for the gradual support of their growth. Such is the peculiar advantage of those finer and more pulverized manures, of artificial application, which find their way most speedily to the roots of plants—such as burnt soil, bone-dust, rape-dust, or fresh soil, salt, &c. Now these manures can be applied by drilling and other modes, within such prescribed bounds as to come exactly in contact with the plant, not being dispersed uselessly over such parts of the field where the stimulus would, at least, be useless for a time. The greater portion of the manures above named may be drilled in, along with the seed itself, so as to fall in its immediate vicinity, within reach of its vivifying action, so as to draw from it the hidden principle which stimulates to production. Such is the plan with the drilling of wheat, barley, turnips, &c.;

and such is the mode also in covering the manure with the moulding-plough, and then dropping the turnip-seed so as to fall immediately above it. In order to provide the manure, however, for this judicious application of management, it must be collected into a mass; it must be placed under the control of the farmer to be divided and directed in the most effective manner—not scattered to the winds—not to be exhausted by the evaporation of a scorching summer sun! Now, when turnips are consumed on the land, it is clear that the droppings of animals must be accidental, without regard to proper distribution or direction. Thus even also with regard to sheep, which are of such vast importance to the improvement of turnip land: their predilection for the sheltering fence will not unfrequently betray the partial distribution of the improvement they leave. With regard to clay soils, however, which are referred to more particularly, and which may at times bring a crop of turnips, it seldom happens that the nature of the soil will admit of the turnips being eaten off by sheep, and if consumed by other stock, the management from such eating must be partial, scanty, and inadequate. Were the crop, however, carted home, and consumed by the various cattle in the straw-yard, or the feeding-shed, or by milch cows, it would, by its admixture with other food, and by its conversion through the process of digestion into manure, far more than compensate for the loss of the turnips not being consumed on the land. In the straw-yard, also, it must be remembered, that the manure is collected into a mass, and can in that state be divided and applied with the greatest precision and effect. It may be stated here, that, in regard to lands which admit of turnips being eaten off by sheep, the more profitable mode of consumption appears to be, to draw and carry home about one-half of the crop for consumption in the fold-yard, stables, and sheds; the remainder of the crop (and particularly of Swedes) will supply an abundance of excellent food for sheep. Swedes may also be sown early in May; and this early sowing gives the opportunity of a second sowing, in case of failure. That man, who has once known the value of a crop of Swedes, will never fail to continue the growing of them: they supply plenty of good food for stock, both at home and abroad. There has been a patent turnip-cutter lately introduced by Gardner, which, with but little labour, does the work admirably, and which enables even lambs to feed off Swede turnips with advantage.

Proceeding to the fourth division of the subject—as to the "comparative progress of stock in fattening or thriving, when consuming drawn turnips, or those still on the land"—all persons conversant with the feeding of stock are aware of the great advantage of giving a proper variety of food to beasts put up for that purpose. The process of digestion, as well as the proper tone of

the appetite, are both stimulated by a well-judged variety. To this consideration may be added, also, the great advantage of sheltering animals from the changes and severity of the weather. Excessive cold not only prevents the growth and improvement of stock, but stints them also as to size. An animal suffering from cold, and shivering beneath the fence, will derive but little improvement from its food. There is probably a proper medium of atmospheric temperature, equally removed from excessive heat and extreme cold, which is required for the bringing out of the most perfect growth of animals.* The black cattle of the North are far below the size and quality of our Lincolnshire, Leicestershire, and Herefordshire stock. By analogy, therefore, it may be concluded that a suitable degree of warmth is beneficial to the growth as well as to the size of animals. Considered in this respect alone, providing that the food were precisely the same, the warmth and comfort which animals enjoy in the fold-yard, sheltered from the cold blast, must have a favourable effect on their thriving and growth. But when to this fact is added, also, the consideration that not only have stock in the yard a suitable degree of warmth, but that they have also a variety of food and a regular supply of it, under a daily and hourly inspection of the superintendent—these advantages will conduce to the thriving of stock, in a far greater degree than could be experienced were they exposed to the severity of the winter in the field, and supported only by one description of food.

With regard to the next subject for investigation, namely, "the comparative quantity and quality of the manure in either of the above modes," it will be admitted, that, in proportion as the animal is in a thriving condition, the manure will be of a proportionably valuable quality. On this account it is that some feeders find the advantage of feeding for the market by meal, cake, turnips, &c., as much by the increased power and value of the manure, as by the profit in price, when cost, labour, expence, and risk, are all taken into account. Turnips being applied to the feeding of stock only as a winter crop, they can only serve the purpose of food during that season; besides which, also, as it regards stock, they are an artificial food, and being thus sustained exclusively by food, which is neither the most natural nor the most congenial, the manure, under such circumstances, will therefore be inferior and of but little value. Besides which, it will be applied by accident—without care, or design, or proper direction. Too much under the fence—too little in the centre of the field—some parts

* The author is mistaken in saying that the black cattle of the North are inferior to the larger breeds in quality. They are smaller, but the quality of their meat is considered in the London markets better than that of any other sort.—SPENCER.

favoured by an abundance—others entirely neglected—all left to chance—nothing directed by care, experience, or system. Under the weight of these facts, therefore, it may be assumed, that, in drawing away turnips from the field to be consumed at home, in combination with other food, not only will the quality of the manure as to its strength be greatly improved, but the quantity, also, under proper distribution and management, may be made to produce far more beneficial and abundant results.

The consideration of the foregoing questions in regard to the "drawing of turnips," has been confined to neat stock. When the crop *can* be eaten on the field by sheep, some of the objections above urged will be neutralized. When the land, however, is in sufficient heart to bring a crop of Swedes, and they are sown on ridges, I believe it will be found most profitable to draw off about one-half of the crop, to be eaten in the fold-yard; the other half to be eaten on the field by sheep. The prejudice which has long existed in the minds of many persons against using manure fresh from the yard, for turnips, is now giving way to the force of experience and facts. The writer of this Essay has never failed to have an abundance of Swede turnips (according to seasons), with the using of manure fresh from the yard, after once turning. Sir H. Davy says, that the process of fermentation and putrefaction is pernicious above the surface of the ground, but salutary, when carried on beneath it.

The land being well cleaned and pulverized as early as possible in May, the manure may be led straight away from the yard, having been once turned over a few weeks before, merely for the purpose of its being spread more regularly in the spaces. The ridges should be formed at 27 inches apart, measuring from the middle of the ridge; and this distance provides not only for the free working of the cart-wheels in the proper spaces, but for the working also of the cutter and mould-board plough, to clean the spaces and to earth up the plants in the last operation after hoeing and weeding. As soon as the ridges are formed, the manure is flung down in proper quantities (10 or 12 good cart-loads to the acre) between them, and then spread carefully by women and children, so as not to miss the giving of nourishment to every turnip-plant as it grows. The ridges are then carefully split by the mould-board plough, and all the manure belonging to the day's work covered neatly over in this manner. The sowing should be done the same day. To a barrow-drill may be attached a small roller, and by this plan the seed has the advantage of being forced into growth by the warmth of the fermentation carried on just beneath the surface on which it is deposited.

As to the expence of "drawing the turnips," it will be found

to be comparatively trifling. One man will draw up and lead away from a good crop on ridges (with a one-horse cart) two loads, containing about 25 cwt. each cart. If we estimate a hundred-weight for each feeding beast per day, and half that quantity for other beasts, one man's labour will supply turnip-feeding for a great number of beasts, either folded or tied up. Something, however, must depend upon the distance of the field, and the abundance and regularity of the crop. Upon a review of the whole subject, it may be stated, that when turnips are grown upon the ridge-system, and at proper distances or spaces from each other, no damage need be apprehended either to the present or future crops by the drawing and the carrying of them away. There is perhaps no crop attainable within the whole range of agricultural produce which yields so valuable a portion of nutritious and wholesome food as the Swede turnip. It is useful in the field—it is valuable at home; and when the crop is divided in the manner above pointed out, it supplies the best of food in the greatest abundance for present use, and produces a plentiful supply of manure for future improvement.

Papplewick, near Nottingham.

XVI.—*On the Gestation of Cows.* By the Right Hon. Earl Spencer, President of the Society. Read May 25, 1839.

For the purpose partly of curiosity and partly because I thought the notions entertained respecting the ordinary period of gestation of cows incorrect, I several years since began to take notes, whenever a cow calved, of the length of time she had been pregnant; and, having now the periods of gestation of 764 cows taken in this way, I think a sufficient number of cases has been collected to enable me to draw general conclusions from the observations which I have made. I am certainly not aware of any practical use to which the knowledge of the results to which I am about to draw the attention of the English Agricultural Society can be applied, but, as they are connected with the physiology of cattle, and as they differ from statements made in some books of deservedly high authority on agricultural science, I think they may be considered sufficiently interesting to induce the Publication Committee to insert this Paper in the Journal.

In order the more clearly to bring under the view of the English Agricultural Society the conclusions to which my observations have led me, I shall begin by inserting a Table which will show how many cows producing live calves have gone each of the different periods therein mentioned. The first column shows the number of days of gestation; the second the number of cows

which have gone each period; the third and fourth columns show whether the produce was a cow-calf or a bull-calf; the fifth, if it was twin cow-calves; the sixth, if it was twin bull-calves; and the seventh, if it was twins of different sexes. For instance, if 279 is taken, it will appear that 32 cows went 279 days; that 16 of them produced cow-calves, 11 of them produced bull-calves, 3 of them produced twin cow-calves, none of them produced twin bull-calves, and 2 of them produced twins of different sexes.

TABLE.

Number of days of Gestation.	Cows.	Cow Calves	Bull Calves	Twin Cow Calves	Twin Bull Calves	Twin Cow and Bull Calves.
220	1	..	1			
226	1	1				
233	1	..	1			
234	1	..	1			
235	1	1				
239	1	1				
242	1	..	1			
245	2	2				
246	2	..	2			
248	1	1				
250	1	1				
252	2	..	2			
253	1	..	1			
254	1	1				
255	2	..	2			
257	2	1	1			
258	3	1	2			
259	1	..	1			
262	1	..	1			
263	2	..	2			
266	1	..	..	..	1	
268	2	2				
269	2	..	1	..	..	1
270	5	2	1	1	..	1
271	6	5	1			
272	3	1	1	..	1	
273	3	2	1			
274	5	..	5			
275	5	2	2	..	1	
276	15	7	6	..	1	1
277	14	10	2	1	..	1
278	18	11	4	1	..	2
279	32	16	11	3	..	2

Number of days of Gestation.	Cows.	Cow Calves	Bull Calves	Twin Cow Calves.	Twin Bull Calves.	Twin Cow and Bull Calves.
280	35	15	20			
281	39	20	18	..	..	1
282	47	26	20	1		
283	54	30	24			
284	66	33	33			
285	74	29	43	..	..	2
286	60	22	38			
287	52	25	27			
288	42	13	28	..	1	
289	45	20	25			
290	23	10	13			
291	31	9	22			
292	16	5	11			
293	10	1	9			
294	8	1	7			
295	7	3	4			
296	6	2	4			
297	2	1	1			
299	1	..	1			
304	1	1				
305	1	1				
306	3	3				
307	1	1				
313	1	1				

From the inspection of this table it will be seen that the shortest period of gestation, when a live calf was produced, was 220 days, and the longest 313 days; but I have not been able to rear any calf produced at an earlier period than 242 days. Any calf produced at an earlier period than 260 days must be considered decidedly premature; and any period of gestation exceeding 300 days must also be considered irregular; but in this latter case the health of the produce is not affected. It will also be seen that 314 cows calved before the 284th day, and 310 calved after the 285th; so that the probable period of gestation ought to be considered 284 or 285 days, and not 270, as stated in the book upon Cattle, published under the superintendence of the Society for the Diffusion of Useful Knowledge.*

* In another work, however, entitled "British Husbandry," published under the superintendence of the Society for the Diffusion of Useful Knowledge, the experiments of M. Teissier, of Paris, on the gestation of cows, are recorded to have given the following results :—

It appears also that the number of breeding females is less considerably than the number of males, and to the number of males ought generally to be added, as animals that will not breed, the females who are twins with males. I have heard and believe, that in some cases a cow-calf, twin with a bull, will breed; but in no instance in which I have bred twins of different sexes has the female been a breeding heifer. The number of breeding heifers from these 764 cows was 354; the number of bull-calves 422; and the number of heifers twin with bulls, usually called fremartins, 11.

There is a prevalent belief among farming men, and I believe farmers, that, when the time of gestation of a cow is longer than usual, the produce is generally a male calf. I must confess that I did not believe this to be the case, but this table shows that there is some foundation for the opinion. In order fairly to try this, the cows who calved before the 260th day, and those who calved after the 300th, ought to be omitted as being anomalous cases, as well as the cases in which twins were produced; and it will then appear that, from the cows whose period of gestation did not exceed 286 days, the number of cow-calves produced was 233, and the number of bull-calves 234; while, from those whose period exceeded 286 days, the number of cow-calves was only 90, while the number of bull-calves was 152.

I am not aware of any other conclusions which may be deduced from the collection of cases which I have made, and, as I have already stated, I do not see in what manner the knowledge of these conclusions can be practically useful; but any information elucidating the physiology of cattle may be advantageous in some way which at the present moment I do not foresee. I think it most probable that these results will be found generally applicable; but it must always be recollected that they are derived from the observations of one breeder only; and though I think it likely that no other man in this country has made similar observations on so large a number of individual cases, still it must be admitted that there is a possibility that, from the circumstance of my experience having been confined to one variety of cattle and to one farm, there may be found a difference in the results to be deduced from a similar experiment, if it was tried on land of different quality, in a different locality, and upon cattle of some other

21	calved between the	240th	and 270th day,	the mean term being		$259\frac{1}{2}$
544	ditto	270th	,, 299th ,,		,,	282
10	ditto	299th	,, 321st ,,		,,	303

"In most cases, therefore, between 9 and 10 months may be assumed as the usual period; though, with a bull-calf, she has been generally observed to go about 41 weeks, and a few days less with a female." Vol. ii. p. 438.—F. Burke.

breed. I will therefore add, that the situation of the farm on which my cattle are bred is in the northern part of Nottinghamshire, that the soil on which they are always kept is either a light sandy soil or peaty meadows, and that they are of the Durham or improved short-horned breed.

XVII.—*On Shed-Feeding.*—By John Walbanke Childers, Esq., M.P. Read July 16th, 1839.

Having tried an experiment on the winter fattening of sheep this year, I think the insertion of it in our Journal may be desirable. It has for some time been my opinion that sheep would fatten more quickly in a yard than in the usual manner on turnips in the field. In consequence of this view of the case, I last winter enclosed a small yard with posts and rails, and erected a low thatched shed, just large enough to allow a score of sheep to lie down at once. The floor of this shed was boarded with common rough slabs, and was raised eighteen inches above the surface of the ground, the boards being placed three-eighths of an inch apart, in order to allow the free passage of water and keep the boards dry, as my great fear was that the sheep might get the foot-rot.

I then proceeded, on the 1st January, to draw forty wether hogs out of my flock of Leicesters, and divided them into two lots, as equal in quality as I could get them. On weighing each sheep separately, I found the weight of one score to be 183 st. 3 lb., and that of the other 184 st. 4 lb. I put the first lot into the yard, and placed the other lot on turnips. The field was a dry sandy soil, well sheltered, and peculiarly favourable and healthy for sheep. Each lot had exactly the same quantity of food given them, which was as follows:—

1st. As many cut turnips as they could eat, which was about 27 st. per diem for each lot.

2nd. 10 lbs. of linseed cakes, at the rate of half a pound per sheep per day.

3rd. Half a pint of barley per sheep per day.

4th. A little hay, and a constant supply of salt.

For the first three weeks both lots consumed equal portions of food, but in the fourth week there was a falling off in the consumption of the hogs in the shed of 3 st. of turnips per day, and in the ninth week there was a falling off of 2 st. more; of linseed cake there was also a falling off of 3 lbs. per day. The hogs in the field consumed the same quantity of food from first to last.

The result of the experiment is as follows:—

20 Shed Hogs.			Increase.		20 Field Hogs.		Increase.	
	st.	lbs.	st.	lbs.	st.	lbs.	st.	lbs.
January 1st	183	3			184	4		
February 1st	205	0	21	11	199	8	15	4
March 1st	215	10	10	10	208	2	8	8
April 1st	239	9	23	13	220	12	12	10
Total Increase			56	6			36	8

Consequently the sheep in the shed, though they consumed nearly one-fifth less food, made above one-third greater progress. The circumstances of the experiment were, if anything, unfavourable to the sheep in the shed: the turnips, by being stored in a house for their use, became drier than those consumed by the sheep in the field; and also in February the shed-hogs were salved or rubbed with mercurial ointment, which is generally supposed to give a check to feeding sheep.

N.B. The boarded floor was swept every day, and fresh straw was given after every shower of rain.

XVIII.—*The Detection of Pregnancy in the Mare and the Cow.* By William Youatt, Esq.

Among healthy animals, the impregnation of the female rarely fails to be the result of an intercourse between the sexes. The assurance, however, of this having taken place is, occasionally, an affair of considerable interest, and of no little difficulty; and the value and the destiny of the female may very much depend on the decision of the question. A certain time having elapsed the thing will speak for itself; but are there any symptoms or circumstances that will warrant the veterinary surgeon, or the agriculturist, in giving a decided opinion on the case in an early period of supposed pregnancy?

It occasionally happens that the fifth or the sixth month arrives, and, even to the practised eye, there are few or no indications of conception having taken place. There are, also, but somewhat unfrequently, diseases which very closely simulate this natural process. Can the veterinary surgeon or the breeder decide? The answer is in the affirmative, and plainly and unequivocally. This is one of the boons which the veterinary art can now confer on the

agriculturist. The altered character of the female is regarded, and very properly, as a circumstance of no little weight. She is comparatively calm and quiet—her appetite returns, and she regains her former condition, and her former habits. Five or six weeks pass, and there is no outbreak of any kind. The owner concludes, and he is not often wrong, that she is impregnated. He, however, has had little to do with mares or with cows who has not witnessed the return of the most furious œstrum, after a much longer period of time has elapsed. I have known more than three months pass in this delusive quietude, and then a salaciousness worse than at first has indicated that no actual impregnation had taken place. On the other hand, the œstrum, but not with all its former fury, has returned, two, and three, and four months after the connexion; and yet, as the result finally shows, impregnation had taken place at their first intercourse.

Many circumstances may cause the owner to be anxious to know the truth of the matter. He may wish to sell her, or he may be unusually desirous to breed from her. Let the animal be examined per vaginam. Let the hand be slowly and cautiously passed up the vagina until it reaches the os uteri. Let there be no attempt to penetrate farther. No information can be gained from introducing the fingers into the uterus. It is simply wished to ascertain the character of the os uteri. In its natural and unimpregnated state it will be closed; but it will not be tightly or spasmodically so, and the contraction of the mouth of the womb will form a kind of cup, with the base towards that viscus. If she is impregnated the entrance to the uterus will be more firmly closed, and the protrusion will be towards the vagina. This is the only exploration per vaginam which I would allow,—it is easily made, and it will be satisfactory. If an exploration of this kind is attempted when half or more than half of the period of pregnancy has passed, it is not at all unlikely that so much irritation of the parts will ensue as to cause the expulsion of the fœtus.

I will suppose that two months have passed since the supposed impregnation. The fœtus is still remaining in the pelvic cavity. The heart has begun to beat and the blood to circulate through its little veins. It will be situated immediately below the rectum. I introduce my hand into that intestine. I have not occasion to pass it very far up. I feel the little substance—for it then is small in proportion to its after growth. I feel it under my hand. I am certain that I am pressing upon the uterus and its contents. I cannot perhaps detect the pulsation of the embryo; but if I had delayed my examination until the fœtus was three months old, I should have assurance that it was there by its now increased bulk, while the pulsation of its heart would tell me that it was living.

For two months from this period in the cow, and for three in

the mare, I should have no other indication of the presence of the fœtus, nor of its life and growth, except from the gradual enlargement of the abdomen of the mother; and, by that time, the little one would have increased in size and strength, and would have begun to take occasional exercise in its first domicile, and then would become the more evident, but not more satisfactory proof of the life of the fœtus—its motion strong enough to be seen through the integument.

I might, perhaps, wish to give this assurance of the life of the fœtus to some curious spectator, or to some intended purchaser. I would not gallop the mare in order to effect this: I would not so far disturb her or the young animal that she bore within her. Much less would I give her cold water to drink, and which she usually would drink until she annoyed the fœtus, and the unborn animal told us how much we annoyed him by endeavouring to shift his quarters and get away from the action of the cold. I would not run the hazard of giving her the colic, and perhaps destroying him or her by this unscientific and somewhat cruel method of exploration; but I probably should give a tap or two on the outer wall of his dwelling, just sufficient to rouse him from his slumbers, and induce him to express his anger at the annoyance by a tolerably distinct plunge or kick.

Most certainly, if it was a cow that I was exhibiting, I would not give, nor would I suffer any one else to give those terrible punches in the right flank which I have no doubt are the cause of much unsuspected injury, and, occasionally at least, connected with, or the origin of, a difficult, or a fatal parturition.

I may here observe that the fœtus of the mare from the beginning occupies nearly the centre of the belly. In the early stage Mr. Mogford generally found it "lying across the pelvic cavity, the spine being immediately under—the head on the left side, and the tail on the right side." In the latter portion of its fœtal state its motions are pretty equally distributed on either side, and the beating of the fœtal heart is most plainly heard at the very base of the abdomen. The fœtus of the cow is huddled up on the right side of the belly. There its motions are most seen, and the beatings of its heart best heard. The enormous paunch, lying principally on the left side, presses every other viscus, and the uterus among the rest, into the right flank. This also explains a circumstance familiar to every breeder. If the cow should happen to carry twins they are crowded together in the left flank, and one seems absolutely to lie upon the other. Whenever the farmer notices the kicking of the fœtus high up in the flank, he at once calculates on twins.

To return from this digression. If half the period, or more, of utero-gestation had passed, and I could not get the little stranger to

move, by my gentle tapping, and it was a cow with which we had to do, and a quiet one, I would have her carefully held by the cowherd, while I stooped and applied my ear flat upon the flank, and then slowly, and with gentle pressure, upwards and downwards, and forwards and backwards, over the flank, and the lower part of it, until I heard—and which I should do in a great majority of cases—the pulsations of the fœtal heart. I should recognise it by their quickness, the pulsations of the fœtus being double or more than double those of the mother.

If it was a mare, I would have a halter put on her, and an assistant should hold up one of her legs while some person interested reached under, or, perhaps knelt under the belly of the mare, and, passing one ear along an imaginary line from between the teats to the chest, and deviating a little from one side to the other, he would there also recognise the quick pulsation of the fœtal heart.

These observations are addressed to practical men, and will be speedily put to the test by them. The object of the author is to get rid of the vulgar and inefficient methods of detecting pregnancy which are now in general use, and to introduce others that are founded on a surer and more scientific basis.

This subject is more fully treated of in the second volume of the 'Proceedings of the Veterinary Medical Association,' p. 126, and in the 12th volume of 'The Veterinarian,' p. 377.

XIX.—*On the* Orobanche *(or Broom-rape), and* Prunella vulgaris *(or Self-heal), plants injurious to Clover.* By James Main, A.L.S.

To the Secretary of the English Agricultural Society.

Sir,

I observe in the first article of your Journal, lately published, the writer, Ph. Pusey, Esq., M.P., refers to a circumstance which requires further investigation than as yet has been bestowed upon it by British farmers. I allude to what that gentleman has reported of the difficulty of raising the common broad-clover in Belgium, owing to the attack of a parasitical plant, of which two species are indigenous in Britain, and which very often deteriorate the quality and diminish the quantity of our second crops of that invaluable fodder.

These parasites are the *Orobanche major* and *O. minor*, commonly called broom-rape—meaning, perhaps, a robber of broom, from their being frequently found on waste ground growing on the

roots of the common broom, and in fields on the roots of clover. In their first appearance they resemble, in some measure, the shoots of asparagus just as they break through the ground. The stems rise from six to ten inches high, and without proper leaves, having what are called bractes instead. The flowers are arranged on the stem, like those of a hyacinth, but not so showy, being of a dingy-brown colour, succeeded by oblong capsules of seeds. A straggling individual plant is sometimes met with among ley-wheat feeding on a clover plant which has escaped destruction by the plough and harrow at wheat sowing; but it never appears again till the field is re-sown with clover.

It is not easy to account for this last-mentioned circumstance, except only by supposing that the seeds are capable of remaining unhurt in the soil for four, five, or more years, or that they are *sown with* the clover.

I have long been inclined to entertain the latter opinion, and for the following reasons: the weed always appears most plentifully on the second crop, and this crop in the south of England is that which is chosen for yielding seed. Of course, the weeds and clover are mowed, carried, thrashed and cleaned together. The seeds of both ripen about the same time, and when mixed together are not easily distinguished without a knowledge of the forms of each, and the assistance of a magnifying glass; but examined apart they are visibly different. The seeds of the broom-rape are like those of clover, only not so plump; neither so large nor so glossy, the skin being rough and of greyish colour.

In cleaning clover seed very fine chip or wire sieves are used, but neither of these are fine enough to separate the smaller seeds of the parasite from those of clover. But sieves may be woven so fine as to separate them, without much loss of the clover-seed; and these should be ordered from the sievewright and used by the grower, and particularly by the seedsman. Both should be well acquainted with the forms of the seeds, so as to identify them at sight. Gathering and keeping a sample of the seed of the parasite is an easy matter, and which may be kept for reference.

There is another British plant which is also too frequently seen on clover leys, and which, from its casual appearance on arable land, must have been saved, and sown with the clover. It has some distant resemblance to clover in the colour of the flower, but, botanically considered, is of a very different genus—I mean the common self-heal (*Prunella vulgaris*); it flowers and ripens seeds along with the seed-clover crop, and it is more than probable that the seeds are mixed in the dressing. As, however, the seeds of the self-heal are smaller than those of clover, they may be riddled out by a properly made sieve.

As the above observations are of some importance to farmers, and particularly to seedsmen, to whom the possession of a pure stock of seed is of so much value, I have taken the liberty of laying them before you.

And, with much respect, remain,
Sir,
Your obedient Servant,
James Main.

3, *Elm Terrace, Fulham-road,*
April 25, 1839.

Note by the Rev. W. L. Rham.

Mr. van Aelbroeck, of Ghent, in his excellent work 'On the Practical Agriculture of Flanders,' states the following experiment on the orobanche :—

"Having chosen a few perches of land, where neither clover nor orobanche had grown for 10 years previously, I had it trenched 15 inches deep, that, in case any seeds of orobanche should accidentally have been there, they might be buried beyond the reach of the roots of the clover; for, unless it meets with these, the seed of the orobanche does not germinate. I concluded that the surface-soil was perfectly cleared of the seeds of this weed.

"The next point was to clear the clover-seed to be sown of any seed of orobanche. The mode I adopted was as follows :—In the month of September of the preceding year I had procured some seed of orobanche; I mixed this with clover-seed, and then examined some of it with a microscope, *for the seed of the orobanche is too small to be distinguished in the mixture by the naked eye.* I saw that the seed of the orobanche adhered to the clover-seed by means of a glutinous substance which is on its surface. I divided the mixed seed into two equal parts, and to one of these I added a fourth part of wood-ashes. I rubbed this well in my hands in order to detach the seed of the orobanche from the clover-seed: I then threw it into a bucket of water, stirring it with my hands for some minutes, and let it settle. The orobanche-seed, *which is as light as the finest dust,* mixed with the ashes, and was gently poured off with the water. The clover-seed, which remained at the bottom, was again washed two or three times with pure water, and then poured upon a sieve, and there again washed, by pouring water over it while it was stirred with the hand. I was now persuaded that all the orobanche-seed had been washed

off, and that the clover-seed was entirely freed from it. I spread this on a cloth, and dusted it with wood-ashes to dry it, that it might be sown. It was sown the same day on a portion of the prepared ground. The clover-seed which had not been washed was sown on another portion. Now, if any orobanche appears in the first portion, said I, my mode of cleaning the seed is not effectual; but, if there is none there, and it comes up in the other portion, then my experiment is conclusive. The result fully realised my expectations: where the seed was sown, without washing, there came plenty of orobanche; where the seed had been prepared, as I have described, there was none.

"I have since repeated the experiment several times on a larger scale, and always with the same success." (L'Agriculture Pratique de la Flandre, par J. L. van Aelbroeck, Paris, 1830, p. 283.)

I am induced to give this extract from the excellent work of Mr. van Aelbroeck, not only as a valuable account of the easiest mode of getting rid of the orobanche, which is so destructive of clover, but also as a good specimen of the manner in which agricultural experiments should be conducted, and the great simplicity of the description. The venerable author, who still enjoys health and vigour at a very advanced age, devotes much of his time and attention to his farm near Ghent; and, from his long practical experience, unfettered by theory, is, on all subjects connected with the cultivation of a light sandy soil, the best authority extant.

The orobanche has never gained any great footing in England, although the seeds, adhering to foreign clover-seed, must often be imported. This may be owing to the soil and climate of England not being so favourable to its growth as those of Flanders; but the knowledge of it, and the easy mode in which the clover-seed may be purified from it, will prevent its spreading, should it ever appear.

W. L. Rham.

August 31, 1839.

XX.—*On the Physical Properties of Soil, and on the Means of Investigating them.* By Professor SCHÜBLER, of the University of Tübingen.*

[The present paper differs from those which have come before, as belonging to the theory, not to the practice of husbandry; and attempting, therefore, to ascertain, not what are the means by the employment of which we may succeed in effecting a particular object, but what are the laws of nature under which all our operations are to be carried on. Both these branches must be followed out together, but distinctly, in order to render our science complete. Theory must not pretend to teach the occupier of land how he is to manage his farm; but so neither should the abstract inquirer, while he keeps within his own bounds, be regarded as visionary by the practical farmer. Some of the results brought out in this paper are striking, others will appear inconsiderable; yet even these last must not therefore be condemned as useless, because it is essential that, in speculating on the causes of such effects as come before us in actual husbandry, we should know not only what hidden powers of nature are operative, but also which of them are incapable of exerting any considerable influence on vegetable or animal life: just as a map points out to the sailor not only those openings of the coast which will afford him a passage, but those also which he must not enter because further progress is barred.—PH. PUSEY.]

SOILS are essentially different in their elementary nature, according to the particular earths which they contain, and the various proportions in which those earths enter into their composition; but soils possessing the very same chemical elements may be endued with widely different properties, in an agricultural point of view, according to the mechanical state of fineness or coarseness of their particles, and the degree of looseness or firmness of texture resulting from their mode of union. The investigation of these *physical properties,* as they are called, is of the highest importance in bringing us acquainted with the nature of soils and the various means within our power of modifying and improving them according to the given circumstances of the case or the intentions which the cultivator of the land has in view.

The several physical properties which may be supposed to exert a greater or less influence on the fertility of soils, and which on that account we shall more closely investigate, are the following:—

I. The weight of the soil; its specific gravity, as well as the absolute weight of a given bulk in a dry and moist state.
II. Its power of containing water, according to weight and bulk.

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* This dissertation forms the Second Section of 'Agronomy,' in a German work entitled, 'Principles of Agricultural Chemistry, in more direct reference to the Economy of Agriculture and Forestry,' by Professor Schübler, of the University of Tübingen: second edition, revised and improved by Professor Krutzsch, of the 'Forest and Agricultural Academy of Tharand,' in Saxony, 1838. Translated from the German by the Secretary and Editor of the Society; who has great pleasure in acknowledging the essential obligations under which his version is laid, in its literary character as well as in its scientific points of interest, by the suggestions, revision, and friendly criticism of Philip Pusey, Esq., M.P., one of the members of the Journal Committee.

III. The firmness and consistency of a soil in its dry and in its moist state.
IV. Its different capability of becoming dry on exposure to the air.
V. Its diminution in bulk on drying.
VI. Its absorption of humidity from the atmosphere.
VII. Its absorption of oxygen from the atmosphere.
VIII. Its power of retaining heat.
IX. Its capability of becoming more or less warmed by the sun's rays.
X. Its capability of developing heat on being moistened.
XI. Its electric polarity and capability of conducting electricity.

We will now consider these several properties more narrowly, and give the process of testing soils in regard to them; to which we will subjoin a comparative arrangement of them, in reference to those earths and soils which come most frequently under the notice of the agriculturist: we have selected for this purpose,—

1. Siliceous sand.
2. Calcareous sand.
3. Finely powdered carbonate of lime, obtained from burnt limestone, which, by long exposure to the atmosphere, has returned to the state of perfect carbonate.
4. A common grey clay, consisting of 68 per cent. of silica, 36.2 of alumina, and 5.8 per cent. of protoxide of iron.
5. Stiff clay or brick-earth, loam, and sandy clay.
6. Earthy gypsum, or gypsum-powder, resulting from the pulverization of the natural white gypsum.
7. A somewhat fine-slaty, red-brown clay marl, frequently found in the Keuper formation of Würtemberg, consisting of 84.8 per cent. of clay with oxide of iron, 6.5 per cent. of carbonate of lime, 7.2 of carbonate of magnesia, and 1.3 per cent. of loosely combined oxide of iron.
8. Humus, or humic acid; and with these investigations should be connected the animal-vegetable humic acid, which is known to be of especial effect on vegetation.
9. Carbonate of magnesia, obtained from the precipitation of solutions of magnesia in acids by alkalies.
10. A fertile, light, black garden-mould, consisting of 52.4 per cent. of clay, 36.5 per cent. of siliceous sand, 1.8 per cent. of calcareous sand, 2 per cent. of lime, and 7.2 per cent. of mild humus and organic remains.
11. A common fertile arable soil, consisting of 51.1 per cent. of clay, 42.7 of siliceous sand, 0.4 of calcareous sand, 2.3 per cent. of lime, and 3.4 per cent. of mild humus and organic remains.

In testing the several properties, we employed, for comparison, white pipe-clay, as one of the purest native clays; fine lime, prepared by precipitation of acid solutions, by means of alkalies; and several other kinds of earth, of which particular mention will be made when we come to discuss the special properties of soils individually.

I. *Weight of the soil.*—In the determination of the weight of the soil, a particular distinction is to be made between the peculiar specific gravity of the several portions of earth and the absolute weight of a determinate volume, as of a cubic inch or foot of the several soils.

The specific gravity of an earth is not found by the mere weighing of a determinate volume, as, for example, of a cubic inch; and comparing such weight with that of an equal volume of water, for we should in that case always obtain too small a weight, as the interstices of every cubic inch of the earth, even when closely compressed, contain much air. The real specific gravity is obtained by the following process:—A glass bottle, with an accurately-fitted stopper, holding some 300 or 400 grains of water, is completely filled with that liquid, and the weight of the whole ascertained; now empty the bottle of half the water, and introduce into the half-filled vessel the soil to be investigated, and which had been previously weighed in its dry state; again fill up the bottle with water, and close it with the stopper as soon as it ceases after a few times shaking to give out air-bubbles from the interstices of the soil, and determine now the weight of the vessel thus filled with soil and water: the specific gravity is found from the quantity of water excluded by the soil from the bottle, by a simple calculation; and we obtain the quantity of such excluded water by subtracting the sum of the weights of the dry soil and the vessel from the weight of the vessel filled with water. An example will best elucidate the process:—

The dry soil to be investigated weighs . .	240	grains.
The vessel filled merely with water weighs	600	„
Therefore the sum of both is	840	„
The vessel filled with the soil and water together weighs	744	„
	96	„

Therefore the soil has excluded 96 grains of water from the bottle, or, in other words, 240 grains of soil require as great a space as 96 grains of water, and the weight of the water bears therefore to the weight of the soil the proportion of 96 : 240, or the specific gravity of this soil is $\frac{240}{96} = 2.50$, when we assume the weight of the water $= 1$.

The actual weight of a determinate volume of soil, which is also called its absolute weight, is obtained simply by weighing a cubic inch or a cubic foot of the soil moderately compressed in the vessel. As the weight of the soil is always very different according to its different states of moistness or dryness, it is desirable to

make this determination as well with soil fully dried at $144\frac{1}{2}°$ F., as also with soil thoroughly moistened; we may consider a soil thoroughly moistened when it is laid in a wet state on a filter, and no longer allows any water to drop through.

Several of the previously mentioned earths exhibited the following differences in my experiments in reference to this point:—

Kinds of Earth.	Specific Gravity, that of Water being taken as=1.	Weight of a Cubic Inch.		Weight of a Cubic Foot	
		In the Dry state.	In the Wet state.	In the Dry state.	In the Wet state.
		Grains.	Grains.	Pounds.	Pounds.
Calcareous Sand	2.722	505	628	113.6	141.3
Siliceous Sand	2.653	495	605	111.3	136.1
Gypsum Powder	2.331	408	573	91.9	127.6
Sandy Clay	2.601	435	577	97.8	129.7
Loamy Clay	2.581	393	551	88.5	124.1
Stiff Clay, or Brick-Earth	2.560	357	531	80.3	119.6
Pure Grey Clay	2.533	334	515	75.2	115.8
Fine white clay (pipe clay)	2.440	213	454	47.9	102.1
Fine Carbonate of Lime	2.468	244	460	53.7	103.5
Fine Carbonate of Magnesia	2.194	75	339	15.8	76.3
Humus	1.370	154	346	34.8	81.7
Garden Mould	2.332	364	457	68.7	102.7
Arable Soil	2.401	376	529	84.5	119.1
Fine Slaty Marl	2.631	498	624	112.0	140.3

From this Table we derive the following general results:—

1. Sand, either in its dry or wet state, is the heaviest part of arable soil, certain fine slaty marls approaching the nearest to sand in this respect.

2. Calcareous and siliceous sand differ but little in this point of view, calcareous sand, however, being the heaviest of the common constituents of arable soil.

3. The clays are lighter the more clay and the less sand they contain, and the contrary.

4. The lime always exhibits a great difference in weight, according to the fineness of its particles and the mode of its preparation; that obtained from slaked lime has a remarkably less weight, even when it has become again saturated with carbonic acid, the reason of which seems to be the great expansion of quicklime on its combination with water. That employed in this experiment lay for six years spread out flat in the state of a fine powder and exposed to the air. When lime is in close combination with carbonate of magnesia, as is the case in dolomite sand, the compound of these two earths exhibits a much greater weight than either of them in its separate state; the specific gravity of such kind of sand rises to 2.82 and 2.83, and even magnesian stony marls often possess this greater weight.

5. The carbonates of magnesia, as artificially obtained by precipitation from their solutions, exhibit indeed the least absolute

weight among the usual ingredients of soil; in arable soils, however, magnesia is not found in this fine form, but usually in combination with lime or silica; in these two combinations it has a coarser form, the physical properties of which approach more nearly to those of sand.

6. Humus, among the usual constituents of soil, has the least specific gravity, and, if we except the pure artificial magnesia, it has likewise the least absolute weight.

7. Compound arable soils are generally lighter in proportion as they are richer in humus; we must not, however, conclude positively from this intimation alone as to the fertility of a soil, since the humus itself is liable to great differences, and even the other pure earths exhibit, according to the fineness of their particles, great diversity in weight, and consequently mixed earths may acquire very different average weights; a more certain evidence on this point is furnished by the specific gravity than by the absolute weight.

8. The usual denomination given by the farmer of heavy or light soils, refers neither to the specific gravity nor to the absolute weight of the earth; clay soils, in their dry as well as in their wet state, are of less weight than sandy soils; these designations, therefore, of heavy and light, refer much more to the different consistence of the earths, of which we shall say more subsequently.

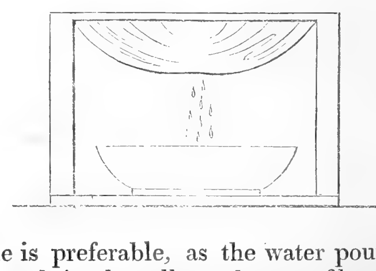
Weight of artificial mixtures of earths.—When different earths are artificially mixed together, a cubic inch of the earthy mixture obtained gives a weight greater than the arithmetical mean (or common average) of the earths entering into the mixture, whether mixed in equal portions according to weight or volume, or in other quantities. I took, in different proportions, a common siliceous sand, a rich clay, and a fine clay-marl, of which I had previously ascertained the absolute weights, and mixed them together, when I determined the weight of the mixture. I obtained the following results:—

Kinds of Earth.	Weight of 5.7 Cubic Inch.	Arithmetical Mean.	Increase of Weight.
	Grains.	Grains.	Grains.
Common Siliceous Sand	2840		
Stiff Clay or Brick Earth	2020		
Fine Clay-marl	1790		
Clay and Sand in equal proportions by weight	2545	2430	115
Clay and Sand in equal proportions by volume	2685	2430	255
2 parts Clay and 1 part Sand by weight . .	2390	2293	97
2 parts Clay and 1 part Sand by volume . .	2470	2293	177
2 parts Sand and 1 part Clay by weight . .	2740	2566	174
2 parts Sand and 1 part Clay by volume . .	2825	2566	259
Equal parts of Marl and Sand by weight . .	2315	2267	48

This phenomenon is only to be explained by supposing a more intimate approach in the interstices of the contiguous earthy particles; something similar, therefore, seems here to happen with this mechanical commixture, to what takes place in a still higher degree with natural mixtures of earthy and rocky materials, for instance, with the dolomite sand and stony marls already mentioned, in which cases not only the absolute weight, but the real specific gravity also is greater than in the separate earths.

II. *Power of soil to contain water.*—We understand by the power of the earths to hold or contain water, their property of receiving and retaining more or less water within their interstices, without allowing it again to flow away by dropping: it is of the greater importance to vegetation, as on it depends the quantity of the means of aqueous nourishment the soil is in a condition to receive and supply to the roots of plants, and as the water itself is likewise one of the most essential sources of nutriment to plants.

The power of an earth to contain water may be found in the following manner: we take 400 grains of the earth to be investigated, and dry it at a temperature of about $144\frac{1}{2}°$ F., until it ceases to lose weight; in order to obtain results that may be compared easily together, it is desirable that the experiment be made with nearly equal quantities of each earth in its fine state, say, with about 400 grains or one cubic inch, because, when a large quantity is employed, the weight alone of the earth occasions the pressure of a greater quantity of water out of it, and we should in such cases obtain different results for the same earth. We put this dried earth on a round filter consisting of unsized paper, and which has been previously weighed in its thoroughly moistened state, and laid in a glass funnel, or on linen stretched over a frame (as in the following figure).



The latter mode is preferable, as the water poured on can more easily flow off, and it also allows the wet filtering paper to be raised up more easily and removed without tearing. We now pour over the earth lying on the filter distilled or rain-water, until it is fully moistened and saturated; and when it has ceased dropping, we bring it, while remaining in this wet state, on the filter, to the balance, to ascertain the weight of the whole; and then, by

a simple calculation, determine the quantity of water absorbed, and power per cent. which the earth exhibits of containing water:—

Let the weight of the dry earth be . . .	400	grains.
The weight of the wet filter	110	,,
Sum of the two . . .	510	,,
The weight of the earth saturated with water, and the filter	706	,,
Therefore the amount of water absorbed is .	196	,,

As 400 grains of this earth absorbed 196 grains of water, 100 grains of the same would retain 49, and the power of this earth to contain water would therefore be expressed by 49.

Should the earth on the filter absorb the moisture with difficulty, and receive it unequally into its interstices, it would be better to mix it in its dry and previously-weighed state with water in a glass vessel, and then pass it by degrees from this vessel to the filter.

When an earth contains much humus and salts of humic acid, it may be best to omit drying it before it is placed on the filter, as the humic acid has the property of taking up less water after it has been once thoroughly dried. In such a case the drying may be made the last stage of the process. But, in earths which contain only a small per centage of humus, as is the case with most arable soils, the power of containing water can be only very slightly affected by that circumstance; and by drying them in the first instance, we in fact obtain a far more decisive result, since it is thus only that we can be sure we have taken them in equal quantities. Clayey soils, too, absorb a different quantity of water, according as they have been submitted in their half-moistened state to a different pressure and different treatment—differences which can only be obviated by previous drying and pulverization.

In an agricultural point of view, it is also of importance to know how much water a given bulk as well as weight of soil can take up, in order to be enabled to form a more correct judgment of the quantity which any given space of ground can absorb. This question is in every case easily answered when we know (by the method already explained) the determinate power of containing water by weight, and the weight itself also of a given bulk of soil in its wet state.* If we have found the power of containing water of siliceous sand equal to 25 per cent. and the weight

* It might appear, that this determination could be made by the mere comparison of the weights of a cubic inch of dry and wet soil, or from the absolute weight of a volume of the dry soil, and its power of containing water; we should, however, in this way obtain no correct result, because many soils, especially those containing clay and humus abundantly, contract considerably in drying, a cubic inch of such dry soils generally occupying a greater space in their wet state.

of a cubic inch of the same in its wet state 605 grains; since 100 grains of this sand absorb 25 parts, the 605 grains, which form the cubic inch, will in like manner absorb 121 grains.

The following Table contains the results of the experiments which I made, in reference to this branch of the subject, with such soils as usually come under the notice of the agriculturist. I add, at the same time, to the list of these soils, the finely prepared carbonate of lime, obtained by precipitation from solutions in acids, and also pipe-clay, as representing one of the purest and finest of the clays:—

Kinds of Earth.	Power of containing water.		A cubic inch contains in the wet state		A cubic foot of the wet earth contains of water
	According to weight.	According to volume.	Grains of water.	Cubic lines of water.	
	Per cent.	Per cent.			Pounds.
Siliceous sand	25	37.9	121	655	27.3
Calcareous sand	29	44.1	141	763	31.8
Gypsum powder	27	38.2	122	660	27.4
Lime, precipitated	47	54.5	174	941	39.1
Fine lime	85	66.1	211	1142	47.5
Fine magnesia	256	76.1	242	1316	62.6
Sandy clay	40	51.4	164	888	38.8
Loamy clay	50	57.3	183	991	41.4
Stiff clay, or brick earth	61	62.9	201	1088	45.4
Pure grey clay	70	66.2	212	1145	48.3
White clay, pipe-clay	87	66.0	211	1142	47.4
Humus	181	69.8	223	1207	50.1
Garden-mould	89	67.3	215	1164	48.4
Arable soil	52	57.3	181	980	40.8
Slaty marl	34	49.9	158	863	35.6

From this Table we obtain the following general results:—

1. The sands have the smallest power of containing water, whether they are compared in weight or in volume with the other earths: siliceous sand has the least power of them all; the sands themselves, moreover, differ according to the different fineness of their grains; with large-grained sand the power becomes diminished down to 20 per cent., while it amounts to 40 per cent. when the particles are exceedingly fine.

2. Gypsum powder very nearly approaches the sands in this respect, and possesses even a somewhat smaller power of containing water than calcareous sand.

3. Slaty marl, notwithstanding the great proportion of clay it has already been remarked to contain, exhibits only a small power of containing water, and in this respect most nearly resembles sand of all the usual constituents of soil; and having this quality, it must be particularly calculated to render the soil both warmer and dryer: these kinds of marl are accordingly frequently applied in the south-west parts of Germany to the improvement of vineyards.

4. Carbonate of lime exhibits great differences in its power of containing water, according to the fineness of its particles; it is therefore important, in investigations of soil, to make a distinction between the fine lime separated by decantation, and the earthy lime as found in the form of sand in an arable land.

5. Carbonate of magnesia, as found in arable soils, is not usually in so fine a form as that artificially prepared for, and used in, these experiments, but exists in a coarse-grained state in combination with lime or siliceous earth: when so combined, it possesses in a far less degree the power of containing water, and approaches in this respect to the character of the sands.

6. Humus has usually the greatest power of containing water of all the common ingredients of soil, and in a still higher degree is this the case when the humic acid has not been previously dried artificially, or when it is still mixed with a large proportion of half-decomposed organic matters, remains of wood, leaves, roots, &c.: 100 parts of the fine earth formed by decaying wood in old trees are capable of absorbing into their interstices nearly 200 and certain light turf-earths from 300 to 360 parts of water, even when they have been previously dried artificially; where we meet with a great water-holding power, one, namely, which exceeds 90, we may reckon with great probability on an abundant commixture of organic matter.*

III. *Firmness and consistency of soil.*—The firmness and consistency of soils is of considerable importance, in regard both to the fertility and to the working of land; the terms universally adopted in husbandry, of a heavy or a light soil, rest on these properties, and therefore deserve inquiry, with regard as well to the dry as to the moist state of the earth.

(*a.*) *Firmness and consistency of a soil in its dry state.*—The determination of the consistence of a soil is one of the more difficult problems, which in physical investigations of the earths ought the less to be neglected, since we can never hope to ascertain it by a mere chemical process. Professor Völker proposed for this purpose, some time ago, a rather complex instrument,† of which the principal part is a kind of spade, the pressure and resistance of which on the field itself is determined by weight; this method cannot, however, be applied in comparative experiments of the consistence of individual soils, on a small scale.

Dr. Meyer (in his determination of the consistence of sandy soils) applies, with this view, a plate of four square inches in

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* On this property of soils see further Note A, p. 213.

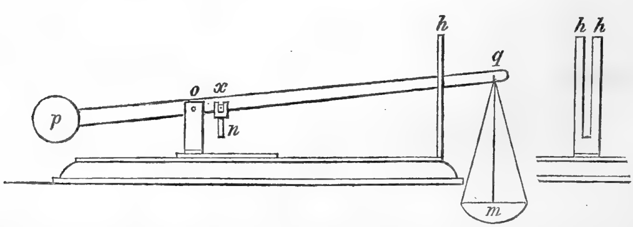
† In the new 'Mögelin Annals of Agriculture,' vol. iv, p. 119, with a plate.

size,* furnished at its four corners with steel points rounded off below, and placed on a layer of soil three inches deep; the weights placed on the plate, which are required in order to force it into the soil, serve as the measure of this consistence: in the case, however, of stiff soils in a dry state, this method is attended with the inconvenience and difficulty of requiring very great weights to be laid upon the plate: with pure clay even 30 pounds are not sufficient for the purpose; while, in the case of very loose earth, the plate sinks too easily. In order to obviate these difficulties, Meyer proposes to submit the earths to this trial with an equal measure (5 per cent.) of water in each—a modification, however, which, in the execution of comparative experiments, has many difficulties.

Among the various methods which I have myself tried, I believe the following may be recommended as the most practicable in the generality of cases, and as applicable not only to the purpose of ascertaining the consistence of mixed earths, but also that of the clays, and even of very strong mortars.

We take the earths we wish to compare in a moderately and uniformly moistened state, and having prepared an open mould or socket of wood (or better of metal), open at the top and bottom, we form oblong square-cornered pieces (or little bricks)

one-third of an inch in breadth and thickness, and about two inches long; we either leave these in the mould to dry of themselves, or remove them from it while in their fresh damp state (by the contrary pressure of a piece of wood of equal size and form); we then allow this moulded earth to dry first in the air and shade, and afterwards to become perfectly dried at a higher temperature of about 144½° F. The different degrees of firmness of the dried earths may now be more easily ascertained by the following simple instrument:—



* See the sketch of this in the 'Flora of the Kingdom of Hanover,' p. 307, Göttingen, 1822.

p q is a scale-beam 20 inches in length, *p* being a ball of lead, by means of which the scale-pan *m* on the longer arm is kept evenly balanced, so long as weights are not put into it; this arm of the balance has its movement within a fork-like section made through the upright piece *h*, of which the fig. *h h* is the front view: *n* is of steel, blunt, spade-shaped in its termination, the 36th part of an inch in thickness, and one-third of an inch in breadth below (as corresponding with the breadth of the rectangular piece of moulded earth, to be submitted to trial); this little spade is secured to the beam at *x*, by a pivot, in such a manner that it always hangs freely straight down. The earth to be examined is now brought under the little spade, weights are put into the scale-pan until the earth is cut through; in the case of earths whose consistency is small, we must commence with dram weights only; with earths of great firmness, the weight required will amount to several pounds; if we give to the beam, from *o* to *q*, a length of 12 inches, while the pivot-point of the little spade *x* is at the distance of one inch from *o*, the weight of a single pound put into the scale-pan will exert on the earth a pressure equal to the weight of 12 pounds; if we repeat the experiment several times, which we can easily do, with the rectangular moulded pieces of the same earth, and take the average of the whole, we shall obtain a result much nearer to the truth. The purest, densest, and heaviest clays to work, which I had occasion to examine by means of this instrument, required, in order to crush them, $4\frac{1}{2}$ pounds in the scale—consequently, an actual pressure equal to 54 pounds.

If we designate the consistence found for the compactest clay by the number 100, the consistence of all the other earths may easily be referred to this as the standard; and thus, independently of the clay itself, we shall be able to institute comparisons between the consistencies of any of the different earths. The principal point is, to form properly and equally worked pieces of the earths to be compared, without too much water; and this, with a little practice, may easily be accomplished by means of the mould already mentioned.

The tabular view given at the termination of the following paragraph, contains the consistencies obtained, according to this plan, of the simple soils most frequently employed in husbandry; a comparative investigation of the firmness of the different kinds of mortar by means of the same instrument, was communicated by me some years ago in an appendix to Alberti's 'Description of the Mountains of Würtemberg' (Stuttgart, 1826, p. 305), which also appeared in an abstracted form in Schweigger's 'Journal of Chemistry,' in 1827; only, with this difference, that in those experiments, I made *n* terminate in a steel point, instead of a short spade.

(*b.*) *Consistence of soil in the moist state, and its attachment or adhesion to agricultural implements.*—When land is worked in a wet state, we have not only to overcome the cohesiveness of the particles among themselves, but at the same time their attachment and adhesion also to the agricultural implements employed. If we wish to subject this property to a comparative trial, we may effect it in the following manner. We fasten large round plates, equal in size, made of iron and wood (as the two materials commonly used for agricultural implements), underneath the scale-pan of a balance, and put weights into the other scale until both are equally balanced; we now bring the plate into exact contact with a moistened earth lying beneath it, and put weights into the other scale-pan until the plate is drawn away from the earth; the amount of such weights corresponds to the degree of adhesion, or to the difficulty of working the earth in its wet state; the degree of this adhesion is often more considerable than would have been expected—an adhesion plate of three or four square inches required upwards of two ounces of counter-weight in order to draw it away from the surface of garden-mould: in the case of the heavier clays, the weight required was as much as five or six ounces. From the size of the plate employed in this experiment, it is of course easy to calculate the amount of adhesion for larger or smaller surfaces.

The following table contains the results derived from experiments made according to the foregoing plans, on the firmness and consistence of earths; the amount of adhesion in the wet state is calculated in pounds on a surface of one square foot.

Kinds of Earth.	In the Dry State.	In the Wet State.	
	Firmness, that of Clay being 100.	Adhesion to Agricultural Implements, on a surface of 1 Square foot; with	
		Iron.	Wood.
Siliceous Sand . . .	0	3.8 pounds	4.3 pounds
Calcareous Sand . . .	0	4.1 ,,	4.4 ,,
Fine Lime	5·0	14.3 ,,	15.6 ,,
Gypsum Powder . . .	7.3	10.7 ,,	11.8 ,
Humus	8.7	8.8 ,,	9.4 ,,
Magnesia	11.5	5.8 ,,	7.1 ,,
Sandy Clay	57.3	7.9 ,,	8.9 ,,
Loamy Clay	68·8	10.6 ,,	11.4 ,,
Stiff Clay or Brick-earth .	83.3	17.2 ,,	18.9 ,,
Grey pure Clay . . .	100.0	27.0 ,,	29.2 ,,
Garden-mould . . .	7.6	6.4 ,,	7.5 ,,
Arable Soil	33.0	5.8 ,,	6.4 ,,
Slaty Marl	23.0	4.9 ,,	5.5 ,,

(*c.*) *General results from these experiments.*—1. If we compare the different consistency of the earths with their different

weight previously given, we shall feel satisfied that the customary terms employed by the farmer of a heavy or a light soil are founded on this cohesion of the soil within itself, and adhesion to agricultural implements, and therefore rather indicate its property of being easier or lighter to work than its weight; the more or less easy penetration of the roots into the surrounding soil will probably be in the same proportion.

2. The consistency and firmness of soils in the dry and in the wet state increase in much the same rate; clay-lands, whether in the dry or wet state, are the most difficult to work, the sandy soils and those containing much humus being the most easy; when we have ascertained the consistence of a soil in its dry state, we shall be able to conclude with much probability respecting its consistence in its wet state.

3. The firmness and consistency of a soil are not in the direct degree of its power of containing water; individual earths, as fine lime and magnesia, and humus, notwithstanding their great power of containing water, possess but little consistency; we cannot, therefore, infer the one property from the other.

4. The consistency is generally the greatest in clayey soils; this, however, is not always the case, as the clays themselves exhibit great differences according to the fineness or coarseness of their grain; fine slaty marl, notwithstanding its great proportion of clay, indicates only a slight consistence; even pipe-clay, although belonging to the purest of the fine kinds of clay, has a far smaller consistence than the ordinary clay of arable soils; I found its consistence in the dry state, from the mean of several experiments, only 42, and therefore not half so great as that of the heavy grey clay of arable soils.

5. Light soils, such as the sandy, gain much cohesive power by moisture; even the purest sand, which in its dry state loses all its coherence and falls into a shapeless powder, regains a certain degree of cohesiveness on being again wetted; a damp climate, therefore, with a large average quantity of rain, will be found, under similar circumstances, more advantageous to sandy districts.

6. In the case of all the earths, the adhesion to a surface of wood is seen to be greater than to one of iron, a circumstance occasioned, without doubt, by wood, even in its finished state, presenting more points of contact than iron to the damp earth; this might appear to be contradicted, by land in wet weather being often more capable of being worked with wooden than with iron implements, such for instance as harrows; the reason of this, however, is to be sought, not in the smaller adhesion of the soil to the wood, but frequently in the circumstance of iron implements, from their greater weight, sinking deeper into the soil in wet weather than wooden ones.

Diminution of the consistency of soil by the penetration of frost.—When soil in its wet state is exposed to the effects of cold in winter, so as to be thoroughly frozen, this circumstance is found to exercise a considerable influence on its consistency; on being completely dried after this exposure, and submitted to the examination already mentioned for the trial of consistence, the degree of that consistence will be found considerably diminished; this is more particularly the case with clays and soils of great consistence: their firmness becomes diminished nearly one-half by exposure to frost: with loamy clay the consistence is reduced from 69 to 45 of the scale previously employed, with an ordinary arable soil from 33 to 20. The presence of moisture is essential for the production of this effect, as completely dry earths suffer no change by frost. This phenomenon is to be explained by the crystallization of the water in the interstices of the soil, occasioned by freezing, in consequence of which, the several particles of earth become forced from their position, and their points of contact are thus rendered fewer in number.

The beneficial influence of breaking up the earth before winter sets in, in order to make it more easy for the frost to penetrate the broken clods, depends on this diminution of consistency occasioned by the frost: but if a soil that has thus been rendered lighter by frost is worked in too wet a state in the early part of the spring, the beneficial loosening which had taken place is again lost, since by such working the earthy particles are once more brought into intimate contact: this is the reason why it is of such lasting injury for a soil to be worked while the weather is too wet. The throwing-out, as it is called, of many plants from the ground in changeable winters, when but little snow falls, as so often occurs, in consequence of alternate freezing and thawing, receives its explanation also in this enlargement of bulk occasioned by the frost in the soil—the smaller plants being thus gradually raised up out of the soil, and their upper roots in consequence very often wholly laid bare of earth, and the whole plant on that account destroyed; plants having the advantages of stronger and more deeply penetrating roots, are consequently far less exposed to be thrown out by frost.

IV. *Capability of soils to become more or less speedily dry, or their power of retaining water.*—It is a question of considerable importance in vegetation, whether a soil gives up its acquired moisture again to the atmospheric air quickly, or retains possession of it for a long time in its pores. By the following process, this property may be subjected to a comparative examination. We place on a round surface of tin plate, having a raised border, a given quantity of the earth to be examined; having previously saturated this fully with water, we spread it out evenly, and

ascertain the weight of the whole; we suffer it to remain for several hours in a closed room to evaporate, and again weigh it to ascertain the quantity of water evaporated during the time; if we make the experiment with many earths at once, we shall be able to institute a comparison among them with the greatest certainty in reference to this point. To obtain accurately the quantity of water contained in the earth at the commencement of the experiment, we afterwards dry it perfectly in an artificial heat, and thus easily reduce the quantity of evaporated water to hundredth parts of that contained in the earth.

	Grains.
Let the weight of a wet earth be	310
The weight of the same earth after 24 hours	260
The weight of the perfectly dried earth	200
Therefore the amount of water evaporated in 24 hours will be	50
And the water in the earth at the beginning of the experiment	110

Since, in this case, 50 of the 110 parts of the water taken up have evaporated, the amount of water vaporized from 100 parts will be 45.5 parts. The following table contains the results of the experiments which I obtained, in reference to this point, with 200 grains of the several earths at a temperature of 65¾°: they were spread out over a surface of ten square inches. The second column of the table contains in one view the portions of time in which the several earths respectively became dry under exposure to the same temperature; I did not require a perfect state of dryness, as this, at a temperature of 65¾° F. and in the open air, could not be expected.

Kinds of Earth.	Capability of drying.		
	Evaporation from 100 parts of absorbed water, at 65¾° F. in 4 hours.	Times required for 90 parts of water to evaporate (at 65¾° F.) from 100 parts absorbed.	
	Parts.	Hours.	Minutes.
Siliceous sand	88.4	4	4
Calcareous sand	75.9	4	44
Gypsum powder	71.7	5	1
Sandy clay	52.0	6	55
Loamy clay	45.7	7	52
Stiff clay, or brick earth . .	34.9	10	19
Pure grey clay	31.9	11	17
Fine lime	28.0	12	51
Humus	20.5	17	33
Magnesia	10.8	33	20
Garden-mould	24.3	14	49
Arable soil	32.0	11	15
Slaty marl	68.0	5	53

General remarks on this property, with further experiments on the same subject. Hence we obtain the following deductions:—

1. The terms of a hot or cold, a dry or wet soil, rest chiefly on this property of earths: sand, gypsum, and slaty marl, of all the earths, are the quickest in becoming dry again; on that account they form what are called the hot soils.

2. The carbonate of lime exhibits great differences in this respect, according to the different form in which it occurs in soils. Calcareous sand dries up very quickly, while fine carbonate of lime yields the moisture it contains far more slowly to the air; the latter has, however, independently of its chemical action on humus, the important advantage over clay of loosening the soil after it is dried.

3. This property of the earths to require a longer or shorter time to become dry, might seem to stand in the same relation as their power of containing water; and with thin layers this is nearly always the case: but with layers of some inches in depth, the proportion deviates considerably, the deeper layers in this case drying more slowly, according to their degree of consistency, and to their greater or less contraction on drying: clay soils with a large proportion of clay exhibit this variation in an especially striking manner.

In order to convince myself more accurately, by positive experiments, of this slower process of evaporation in the case of deeper soils, I placed ten earths of very different power of containing water in round tin vessels, equal in size, 1 inch in depth and $1\frac{3}{4}$ in diameter—allowing them, after previous saturation with water, to become gradually dry, in a closed room whose temperature varied from $65\frac{3}{4}°$ to $72\frac{1}{2}°$ F.; I determined their weight at the commencement of the experiment, after thirty-six hours, and at the end of four days. They gave off their moisture to the air, at first, according to that relation of their power of retaining water which had already been shown by the experiments with shallow layers; as soon, however, as their upper surface had become in some measure dry, and they were contracted into a more or less diminished space, this result varied in the following different degrees; for easier comparison, the power of containing water possessed by the earths employed in these experiments is here also annexed:

Kinds of Earth.	Water evaporated in 4 days.	Power of containing water of the earths.
	Grains.	Per cent.
Calcareous sand	146	29
Light garden-mould	143	89
Gypsum powder	136	27
Very light turf-soil	132	366
Slaty marl	131	34
Arable soil	131	60
Fine magnesia	129	256
Black turf-soil, not so light	128	179
White fine clay	123	70
Grey fine clay	123	87

Whence follows, that the different degree of looseness or consistency of the ground has a considerable influence on the more or less easy drying of deep soils; the garden-mould employed in these experiments, notwithstanding its great power of containing water, in which it stands near to pure clay, gave off again to the air far more moisture in the same time than the clays; likewise the turf-soils and magnesia, notwithstanding their great power of containing water, became dry again at a quicker rate than the clays; the fine grey clay, after fourteen days, exhibited in these experiments still a damp surface, while the surfaces of the turf-soils and magnesia became perfectly dry many days earlier: since the consistency of a soil, and its tendency to become contracted into a narrower space, exerts so great an influence on the drying of a stratum only one inch deep, this must, of course, be the case in a far higher degree with beds of soil having a depth of several inches.

V. *Diminution of bulk on drying.*—The greater number of soils become contracted into a narrower space on drying; and in consequence of this circumstance, cracks and fissures frequently occur in land, and have an injurious effect on the vegetation, as the finer roots, which often ramify horizontally, and not unfrequently supply to the plants the greater part of their means of nourishment, are, by such contractions, either laid bare of soil or torn asunder. In order to subject soils to comparative experiments on this point, the following plan may be adopted: we either form of the earths, in their wet state, large cubic pieces of equal size, being at least ten lines (or ten-twelfths of an inch) in height, breadth, and length, and therefore 1000 cubic lines (or a little more than half a cubic inch) in content, or we let such earths be fitted and dried, one after the other, in an accurately-worked cubic inch; after some time, when the weight of these cubes of earth ceases to change by

further drying, we measure the dimensions of the cube by means of a rule on which the tenths of lines can be distinguished, and may thus calculate easily the volume of the earth, and consequently find the diminution in bulk which has been caused by the drying.

The experiments I made with the simpler earths, exhibited on this point the following differences:—

Kinds of Earth.	1000 cubic lines became diminished in volume to	1000 parts therefore diminished in volume by
Siliceous sand . . . . Calcareous sand	(no change)	. .
Fine lime	950 cubic lines	50 parts
Sandy clay	940 ,,	60 ,,
Loamy clay	911 ,,	89 ,,
Stiff clay, or brick earth . . .	886 ,,	114 ,,
Grey pure clay	817 ,,	183 ,,
Carbonate of magnesia . . .	846 ,,	154 ,,
Humus	800 ,,	200 ,,
Garden-mould	851 ,,	149 ,,
Arable soil	880 ,,	120 ,,
Slaty marl	965 ,,	35 ,,

General remarks.—1. Gypsum, in this respect, is seen to be very similar to the sands, and diminishes its volume in a very inconsiderable degree.

2. Fine carbonate of lime, notwithstanding its great power of containing water, gives on drying only a very small diminution of bulk, not by any means so great as that of clay; this property of the earths does not stand, therefore, in the same proportion with their power of containing water, and in as little with the firmness and consistency of the soil; humus, notwithstanding its little consistency, exhibits on drying a remarkable degree of contraction.

3. Among those earths which are free from humus, clay is the one which gives the greatest diminution of bulk on drying; an addition, however, of sand, or of carbonate of lime, diminishes this property considerably.

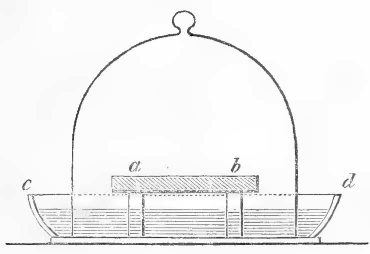
4. The tendency of many kinds of marl to fall into numerous small pieces on drying may be explained from this great difference which clay and lime, the elements of marl, experience in their diminution of bulk on drying after having been moistened; these individual parts changing their volume in a different degree, and thus occasioning a more easy disintegration of the natural compound we call marl.

5. Humus, of all the usual ingredients of soil, experiences on

drying the greatest diminution of bulk, contracting one-fifth of its volume on being dried, and again expanding in the same proportion when moistened with water; this explains the reason why the upper surface of the earth in damp turf bottoms, containing much humus, frequently rises or sinks several inches accordingly as the soil is penetrated with more or less water, and why this elevation of wet turf-soils becomes still more remarkable, when a sharp frost sets in after wet weather, the freezing, by its expansion, still further increasing the volume of the particles of water which had previously penetrated the turf; hence, too, the reason why these turf-bottoms have in their wet state a remarkable elasticity if heavily trodden upon, and often occasion, in consequence of that yielding property, the feeling of fluctuation.

VI. *Property of the earths to absorb moisture from the atmosphere.*—Most of the earths which are commonly found in soils have the property in their dry state of absorbing moisture from the atmosphere, and this circumstance has a considerable influence on their different degrees of fertility.

The amount of this absorption may be found, by spreading a given quantity of the fine and previously well-dried earth on a plate, and placing it under a glass receiver, having its inverted mouth closed underneath by immersion in water:—



a b is the earth lying on the plate, which rests on a stand; *c d* is the vessel below, containing the water into which the receiver is inverted and thus closed from the external atmosphere. We allow the earths to remain under this receiver the same time respectively —12, 24, or 48 hours—in a mean temperature, varying from 59° to $65\frac{3}{4}$° F. and then weigh them again; the increase of weight corresponds to the quantity of water absorbed. The following Table exhibits a statement of the results I obtained, in reference to this inquiry, with the usual earths; the whole of the experiments were made in a temperature which varied between 59° and $65\frac{3}{4}$° F., and the amount of absorption is given in grains:—

Kinds of Earth.	1000 grains of Earth on a surface of 50 square inches, absorbed in—			
	12 Hours.	24 Hours.	48 Hours.	72 Hours.
	grains.	grains.	grains.	grains.
Siliceous sand .	0	0	0	0
Calcareous sand	2	3	3	3
Gypsum powder	1	1	1	1
Sandy Clay . .	21	26	28	28
Loamy Clay . .	25	30	34	35
Stiff Clay . .	30	36	40	41
Grey pure clay .	37	42	48	49
Fine lime . .	26	31	35	35
Fine magnesia .	69	76	80	82
Humus . . .	80	97	110	120
Garden-mould .	35	45	50	52
Arable soil . .	16	22	23	23
Slaty marl . .	24	29	32	33

General remarks.—1. Excepting the siliceous sand, all kinds of soil have the property of absorbing moisture from the atmosphere; the slaty marl, which, in regard to consistency and power of containing water more nearly approaches the sand, distinguishes itself more favourably than them in this respect; the absorption is seen to be generally the strongest in the clay-soils, especially when they contain humus.

2. Humus, of all the simpler constituents of soil, shows the greatest power of absorption: in this respect, however, the kinds of humus themselves furnish marked differences; the pure vegetable dried humic acid simply obtained from turf, in extended experiments made by myself, absorbed moisture from the air far less easily than that prepared from animal manure.

3. The absorption is always the greatest at first; the earths always absorb less in proportion the more they gradually become saturated with moisture, and they generally attain that point after a few days; if exposed to the sun-light, a portion of the absorbed moisture becomes again vaporized; in nature, a daily periodical change in this respect appears to take place, which must have a beneficial effect upon vegetation: the earths absorb moisture at night which they partially give off again during the course of the day.

4. Fertile arable soils generally possess a great capability of absorption; still we must not conclude at once from the power of absorption alone which a soil may manifest, as to its fertility, since even clay soils without any humus absorb considerable moisture from the air; in the above experiments the pure sterile clay ab-

sorbed, in 12 hours, 37 grains of moisture, and consequently more than a very fertile garden-mould, which in the same time had absorbed only 35 grains. The assumption of Davy,* that this capacity of absorption possessed by a soil was to be received as a conclusive proof of its fertility, is liable, therefore, to many exceptions:—and, if applied without modification, might easily mislead.

VII. *Property of earths to absorb oxygen gas from the atmosphere.*—The earths possess the remarkable property of absorbing oxygen gas from the atmospheric air, a phenomenon pointed out many years ago by Alexander von Humboldt;† this fact has indeed been subsequently called in question by some philosophers, but a more recent and extensive series of observations which I have myself made on this subject, and communicated in the eighth volume, pages 141, &c., of the new series of Schweigger's 'Journal of Chemistry,' shows that this property of the earths is confirmed almost without an exception, provided they be employed for this purpose in a moist state; the capability, therefore, of the earths to absorb moisture from the atmosphere appears to be of great importance, in dry seasons, as a preparation for this further process of absorbing oxygen, which we have now to examine.

In order to examine this property, introduce determinate quantities of the several earths, about 200 grains of each, in their moistened state into glass vessels (flasks) of equal size, and containing each about three or four cubic-inches of atmospheric air; make them air-tight by means of stoppers, surrounded at the edge with resinous cement; and, after several days have elapsed, test this included air for the quantity of oxygen it may contain by means of an accurate eudiometer, and thus ascertain the amount of oxygen gas absorbed, by the diminution which is found to have resulted in the proportion of that gas contained in the remaining air. The following table contains the results I obtained from my experiments on this point with the several earths; the experiments were made in glass vessels of 15 cubic-inches' contents, and with 1000 grains, in each case, of the several earths in a moderately moistened state, and in a temperature varying from 59° to $65\frac{3}{4}$° F.; excepting in the case of magnesia, of which, on account of its levity, only half that quantity was taken; the air remaining was afterwards analyzed by the voltaic eudiometer, and from the volume of the air absorbed its quantity was calculated by weight; for the sake of comparison, other earths of the same kind were likewise exposed in a state of perfect dryness.

* Davy's 'Agricultural Chemistry,' 4to. 1813, pages 159, 160.
† Gilbert's 'Annals of Philosophy,' vol. i. p. 512.

Kinds of Earth.	Absorbed in the dry state.	In the wet state. Absorption in 30 days, by 1000 grains of Earth, from 15 Cubic Inches of Atmospheric Air containing 21 per cent. of Oxygen.		
		Per cent.	Cubic inches.	Grains.
Siliceous sand	0	1.6	0.24	0.10
Calcareous sand	0	5.6	0.84	0.35
Gypsum powder	0	2.7	0.40	0.17
Sandy clay	0	9.3	1.39	0.59
Loamy clay	0	11.0	1.65	0.70
Stiff clay, or brick-earth	0	13.6	2.04	0.86
Grey pure clay	0	15.3	2.29	0.97
Fine Lime	0	10.8	1.62	0.69
Magnesia	0	17.0	2.66	1.08
Humus	0	20.3	3.04	1.29
Garden-mould	0	18.0	2.60	1.10
Arable soil	0	16.2	2.43	1.03
Slaty Marl	0	11.0	1.65	0.70

General remarks, with further experiments on this property.—All the earths lose on drying the property of absorbing oxygen from the air, but regain it in the same proportions as before on being moistened; if covered about a quarter of an inch deep with water in the closed vessel, the absorption takes place in the same manner; water alone, however, in the same quantity, and in the same vessels, absorbs only a very small portion per cent. in the same time, a clear proof that it is the earths themselves which induce this process in a different proportion.

2. Humus, of all the ordinary earths, exhibits the greatest degree of absorption of oxygen; the clays approach nearly to it; sand shows the least; fertile earths rich in humus absorb in general more than others which are poorer in humus and clay; the included air standing over them becomes at last so poor in oxygen that lights would become extinguished, and animals die in it.

3. In the mode of absorption, there is an essential difference between humus and the inorganic earths; humus combines partly with the oxyen in a strictly chemical sense, and assumes a state of higher oxygenation, in consequence of which there is formed also some carbonic acid; the inorganic earths, on the contrary, absorb the oxygen gas without intimate combination; if dried in a higher temperature than from 167° to 189½° F., the oxygen escapes again, but they re-absorb it on being moistened; this experiment may therefore be many times repeated with the same earth.

4. In the case of earths which are frozen, or covered with a surface of ice, no absorption of oxygen takes place, any more than in the case of dry earths; in a moderately warm temperature, varying

between 59° and $65\frac{3}{4}$° F., the earths absorb in a given time more oxygen than in a temperature only a few degrees above the freezing-point.

5. When any fertile soils are entirely covered with water, and exposed at a warm season to the influence of sun light, confervæ begin usually to form very soon on their surface, what has been called the green matter of Priestley (*Protococcus viridis*, Agardh, and *Priestleya botryoides*, Meyen); as soon as these are formed, oxygen is developed through the influence of the sun-light on this vegetable matter; when this experiment is made in close vessels, a distinct increase is perceived in the air standing over the water: the oxygen contained in it was increased in some of my experiments to 25 and 27 per cent., though the atmospheric air of the vessels at the beginning of the experiments had, as usual, only a proportion of 21 per cent. contained in it; this phenomenon agrees with many other observations in rendering it probable that a portion of the oxygen gas, which during the warmer season suffers a diminution from so many processes of animal life and vegetation, is again compensated for by the action of sun-light on the products of the vegetable kingdom.

6. With regard to the reasons of this absorption of oxygen gas, they are partly founded on the general property of many porous bodies, in the damp state particularly, to absorb oxygen gas, without any direct chemical combination being formed by them with these bodies, as Ruhland has already accurately pointed out; and the principle of this absorption may partly be sought for in the proportion of humus and oxide of iron, which arable soils always contain in greater or less quantity; if the earths be previously burnt, and their portion of humus thus volatilized, while the oxide of iron is raised to a higher degree of oxidation, their power of absorption of oxygen becomes considerably diminished thereby, and in some instances disappears.

Phenomena explained by this absorption of oxygen gas.—Many phenomena prove that oxygen plays one of the most important parts in the economy of plants and animals; that in particular it is highly necessary in the germination of seeds and for the growth of plants; by loosening, digging, ploughing, and working the soil in any way, fresh layers of earth are brought successively into contact with the air, and fertilized, as it were, by the absorption of oxygen gas; from the above experiments, however, we infer that dryness influences this process unfavourably, and that it is therefore desirable to keep the soil in a moderately damp state, where that can be done.

2. Soil freshly brought up from below is generally found less fertile at first than it afterwards becomes when it has been exposed to the air and worked for a longer period; it seems by these

means to become for the first time saturated with the quantity of oxygen essential to vegetation, while at the same time it becomes looser, and enriched with greater portions of humus from manures or decaying vegetables.

3. Clay-soils containing humus exhibit a particularly strong absorption of oxygen; they maintain themselves also for a longer time moist in dry weather than the sandy soils; properties, both of which must contribute to the fertility of these soils, especially when they are at the same time sufficiently free.

4. In subterraneous cavities excluded from the air, for instance in mines, there occurs not unfrequently a production of suffocating air, or choke-damp, as it is called, a phenomenon which appears to be often a consequence of this absorption of oxygen gas. The strata which enclose these places being frequently damp and clayey, are consequently capable of absorbing easily the oxygen gas from the air included within them, while the mephitic air is thus left in their recesses: if these strata contain also humus, or especially if carbon be found in them, as is the case with coal-blende, pit-coal, &c., they will form carbonic-acid gas; should decomposition of water take place, in consequence of metallic agency, as might so easily ensue with the sulphuretted pyrites, hydrogen gas is set at liberty, and an explosive atmosphere becomes thus easily formed.

5. In the clay-soils, nitric acid and the nitric salts are frequently formed; this occurs particularly during the artificial production of saltpetre and in the slow process of saltpetre-beds; and is also found to take place spontaneously here and there in the upper beds of soil, independently of the effect of artificial means; the absorption of oxygen gas induced by the soil, has probably a very considerable influence in these formations of nitric acid.

VIII. *Power of the Earths to retain Heat.*—The earths have the property of giving out again to surrounding bodies, in different lengths of time, the warmth communicated to them by the sun or the temperature of the atmosphere, and of retaining, therefore, such warmth within themselves for a longer or shorter space of time; this may be termed their power of retaining heat. It is not identical with specific heat, as it does not depend merely on that condition, but on the different capacity as well, which bodies possess of conducting heat. It is generally of a higher degree in proportion as the specific heat of a body is greater, and its power of conducting heat is less; these two properties combined will constitute the power of retaining heat.

We may adopt the following process for examining the power of retaining heat. We place equal quantities of the several earths in the dry state in large vessels of similar size, made of thin

tin-plate, and having heated them to the same temperature, we observe, by means of a thermometer inserted in the middle of the mass, the time they respectively require to cool down again to the original degree of temperature.

The several earths gave me the following differences in this respect. I heated 30 cubic inches of earth in each case up to $144\frac{1}{2}°$ F., and observed in a close room, having the temperature of $61\frac{1}{4}°$ F., the time which they respectively required to cool down to $70\frac{1}{4}°$ F.; and having set down the power of retaining heat in the case of calcareous sand, as equal to 100, I reduced the remainder to this standard.

Kinds of Earth.	Power of retaining Heat, that of Calcareous Sand being = 100.0	Length of time required by 30 Cubic Inches of Earth to cool down from a temperature of $144\frac{1}{2}°$ to $70\frac{1}{4}°$ F. in a surrounding temperature of $61\frac{1}{4}°$.
Calcareous sand . .	100.0	in 3 hours, 30 min.
Siliceous sand . . .	95.6	3 — 20 —
Gypsum powder . .	73.8	2 — 34 —
Sandy clay . . .	76.9	2 — 41 —
Loamy clay . . .	71.8	2 — 30 —
Stiff clay, or brick-earth	68.4	2 — 24 —
Grey pure clay . .	66.7	2 — 19 —
Fine lime	61.3	2 — 10 —
Humus	49.0	1 — 43 —
Fine magnesia . . .	38.0	1 — 20 —
Garden-mould . .	64.8	2 — 16 —
Arable soil . . .	70.1	2 — 27 —
Slaty marl	98.1	3 — 26 —

General Remarks.—1. The sands possess the greatest power of retaining heat when the earths are compared in equal quantities according to bulk; hence may be explained the dryness and heat of sandy districts in summer. Such districts, after sunset, must also maintain a higher temperature and for a longer time than others the soils of which possess a smaller power of retaining heat; and the slight power which sandy soils possess of containing water, in consequence of which but little warmth is abstracted from them by evaporation, must still further increase the degree of this property.

2. The slaty marl stands next to sands in regard to its power of retaining heat; and having at the same time a greater power of containing water, this circumstance must contribute to its fertility.

3. Among the ordinary constituents of soil, humus is that which has the least power of retaining heat. Turf-soils, too, abounding in humus, grow warm but slowly, because they are

endued with a very great power of containing water, and have, in the first place, to lose by evaporation a portion of this water contained in them.

4. The small power of retaining heat evinced by fine magnesia, prepared artificially, would seldom be the same as that which this earth would have as a mixed ingredient occurring naturally in soils, being usually found under such circumstances in a coarser form combined with other earths, as in sands and slaty marls, which possess a great power of retaining heat.

5. If we compare in the earths their power of retaining heat with their other physical properties, we shall find it to be most nearly in proportion to the weight of a determinate volume, that is, to the absolute weight; the greater mass an earth possesses in the same volume, the greater will be in general its power of retaining heat; we may, therefore, from the absolute weight of an earth, conclude, with a tolerable degree of probability, as to its greater or less power of retaining heat.

IX. *Warming of Soils by the Sun.*—The earths acquire heat from the sun in different proportions, and this property may exert a sensible influence on vegetation; upon it, therefore, may be founded, in some degree, the terms of a cold or hot soil. Land consisting of a light-coloured clay is warmed much more slowly and less powerfully by the sunlight, than one consisting of a dark-coloured dry soil; black garden-mould, rich in humus, becomes much warmer than meagre limestone or clay soils.

Very different external circumstances have an influence on the degree of warmth thus imparted, and these may be referred to the following four points:—1. The different colour of the surface of the earth; 2. The different degree of dampness in which the earth exposed to the sun's rays happens to be at the time; 3. The different component materials of the soil itself; and 4. The different angle at which the rays of the sun fall upon the soil: the influence of each of these circumstances requires to be examined.

Influence of the Colour of Soils on the warmth received by them from the Sun.—The influence of colour on the amount of heat may be observed easily in the following manner. We place thermometers in the several soils, covering their bulbs about an eighth of an inch high with earth; in order to impart to each a different colour, we sprinkle them over respectively with differently coloured powders, leaving one of them exposed to the sunlight in its natural state and colour; for the communication of a black colour we may employ the soot obtained in the combustion of fir and resin (lamp-black); and for a white colour, fine magnesia; these are to be sprinkled over the surface of the soils by means of a fine lawn sieve

When soils are, under these circumstances, exposed to the heat of the sun, the black-coloured specimen always attains a considerably higher temperature than the naturally grey-coloured, and the latter again a higher one than the artificially white-coloured earth; the differences of temperature, in these cases, amounting usually to many degrees. In experiments, which I made on this subject, in the latter end of August, when the temperature of the air in the shade was 77° F., that of the surface of black-coloured sand rose from 77° to $123\frac{1}{2}$° F.; that with the natural colour to $112\frac{1}{2}$° F.; and that, on the contrary, with the white, to only 110° F. That is to say, while the warmth of the white-coloured sand rose 33°, that of the black-coloured sand rose $46\frac{1}{2}$°, or almost one-half more. The other earths exhibit corresponding differences. When the differently-coloured earths are even exposed for hours to the sun, they never attain the same degree of temperature, the lighter-coloured earths always remaining considerably cooler, while the black-coloured acquire the greatest degree of heat.

Hence we see why the mere sprinkling of earth, ashes, or other powders of a dark colour on snow, accelerates its melting; and also why the dark colouring applied to inside and outside walls, or the naturally dark colour of many kinds of slate and slaty marl, has the effect of accelerating the ripening of fruit, as grapes, melons, &c., planted against them.

Influence of Moisture on the Warming of Soils.—The influence of the damp or dry state of soils on their acquisition of warmth is also considerable. If we expose earths of the same kind in a dry and wet state to the sun, the wet earth never attains the same degree of heat; its temperature, as long as it remains moist, being always many degrees less than it would acquire in a dry state. The depression of temperature arising from the evaporation of their water, amounts to $11\frac{1}{4}$° or $13\frac{1}{2}$° F.

As long as the several earths, at the early part of the experiment, remain saturated with water, they exhibit but little difference in their power of acquiring heat, as they give off to the air, in this state of saturation with water, nearly equal quantities of vapour, in the same time; when they have become, however, in some measure dried in the air, their differences of temperature are found to become greater; light-coloured earths, with great powers of containing water, acquire heat in consequence the most slowly, while dark-coloured sand and slates, on the contrary, with less powers of containing water, become warm on both these accounts, in a quicker and more powerful manner.

Influence of the different Materials constituting Soil, on its acquisition of Heat.—The different ingredients which enter into the composition of soils have, in themselves, far less influence on

the capacity of soils to become warmed by the sun, than their colour and dryness. If we impart to earths artificially the same colour, and expose them in a similar state of dryness to the heat of the sun, the differences of temperature will be inconsiderable; so that the differences in this respect shown by the several earths in their natural state may be referred in a particular manner to these two leading circumstances, colour and dryness.

The following table contains the results of a series of experiments which I made on the different degrees in which earths acquire warmth from the sun in fine weather. I placed these earths in vessels of four square inches in surface and half an inch deep, and exposed them to the rays of the sun, coloured differently on the surface, and furnished with thermometers as already described; the observations were made in the latter part of August, and between 11 and 3 o'clock in the day, while the temperature of the air varied in the shade from $72\frac{1}{2}°$ to 77° F. As all the observations could not be made at once, the temperature which sand acquired on the same occasion was in each case taken as the standard of comparison, to which all the several observations have been reduced.

Kinds of Earth.	Mean of Highest Temperature of the upper surfaces of the Earths. (77° F. in the shade.)			
	With a surface of the natural colour.		With dry earth.	
	Wet.	Dry.	With a white surface.	With a black surface.
Siliceous Sand, bright yellowish-grey	99°.1	112°.6	109°.9	123°.6
Calcareous Sand, whitish-grey . .	99.3	112.1	109.9	124.0
Gypsum, bright white-grey . . .	97.3	110.5	110.3	124.3
Sandy clay, yellowish	98.2	111.4	108.3	121.6
Loamy clay, yellowish	99.1	112.1	107.8	121.1
Stiff clay, or brk. earth, yellowish-grey	99.3	112.3	107.4	120.4
Fine bluish-grey clay	99.5	113.0	106.3	120.0
Lime, white	96.1	109.4	109.2	122.9
Magnesia, pure white	95.2	108.7	108.7	121.3
Humus, brownish-black	103.6	117.3	108.5	120.9
Garden-mould, blackish-grey . . .	99.5	113.5	108.3	122.5
Arable soil, grey	97.7	111.7	107.6	122.0
Slaty marl, brownish-red . . .	101.8	115.3	108.3	123.4

Influence of the Inclination of the Ground on the amount of Warmth it acquires from the Sun.—The inclination of the ground towards the sun has a very considerable influence on the degree of warmth which the soil receives from its rays; and the amount of warmth so produced is, under similar circumstances, always greater the more nearly the incidence of the ray approaches to a

right angle, or 90 degrees, with the surface. If the actual increase of temperature produced by the rays of the sun beyond the temperature in the shade be between 45° and 63°, as is often the case on clear summer days, this increase would be only half as great if the same light spread itself in a more slanting direction, over a surface twice as large. Hence it is sufficiently explained why even in our own climate the heat so frequently increases on the slopes of mountains and rocks, which have an inclination towards the south. When the sun is at an elevation of 60 degrees above the horizon, as is more or less the case towards noon in the middle of summer, the sun's rays fall on the slopes of mountains which are raised to an inclination of 30 degrees to the horizon, at a right angle; but even in the later months of summer, the sun's rays frequently fall on them under a right angle, in cases where the slopes are yet steeper. Such declivities, particularly in our own geographical latitude (of Germany), are therefore peculiarly suited for the cultivation of plants which require a high temperature, such for instance as the vine.

If we compare accurately the power of the sun's rays to warm the soil with reference to the different seasons, we shall perceive more distinctly the influence of the different inclination of the ground towards the sun. I made some careful observations at Tübingen some years ago on this subject, the results of which I have arranged in the following table, in comparison with other observations which I had made previously at Geneva. Those observations, which are marked as having been made in fine weather, exhibit the mean highest temperature of an ordinary blackish-grey garden-mould, the temperature of which was observed on the south side of my house, in perfectly fine weather, between noon and one o'clock, whenever the weather happened to be perfectly fine at that part of the day. They are founded on the average of two years' observations: the bulb of the thermometer was covered only the twelfth of an inch high with earth, and its scale being of clear glass could contribute nothing to the elevation of temperature. Those figures in the table which refer to variable weather rest on observations made in the Botanic Garden at Geneva, in the year 1796: they contain the mean of the observations made every day, and not merely of those taken in fine weather. The elevation of temperature by the rays of the sun was therefore considerably less according to the average results of these observations, because the temperature of the upper surface of the earth on cloudy and rainy days often accords exactly with that of the air; but on the other hand, they give us more accurately the mean temperature of the ground at some depth.

Months.	In perfectly Fine Weather.			In Variable Weather: Mean of the whole Month.			
	Mean Temperature of the		Elevation of Temperature by the Sun's Rays in Degrees.	Mean Temperature.			
	Earth's Surface.	Air in the Shade.		Of the Earth's Surface at Noon.	At three Inches below the Soil.	At four Feet below the Soil.	Of the Air in the Shade.
January .	54°.1	24°.6	29°.5	43°.0	38°.5	39°.4	38°.2
February .	86.2	43.0	43.2	45.7	39.8	38.6	36.8
March . .	99.5	46.6	52.9	53.2	43.2	38.1	38.1
April . .	121.6	61.7	59.9	78.9	60.7	48.3	50.1
May . .	131.2	67.3	63.9	80.1	64.4	54.6	55.9
June . .	139.8	75.2	64.6	89.1	73.6	61.5	60.9
July . .	146.3	81.3	65.0	93.4	73.3	64.9	63.2
August .	130.1	68.9	61.2	96.0	76.9	68.6	65.8
September	119.8	68.0	51.8	82.8	70.2	66.1	62.4
October .	80.8	42.8	38.0	59.8	54.4	58.8	51.8
November	72.7	40.1	32.6	47.3	43.7	49.0	41.6
December	59.2	35.6	23.6	35.3	33.3	39.0	32.1
Means . .	103.4	54.6	48.8	67.1	56.0	52.3	49.7

The highest temperature occasioned by the mere heat of the sun in the last two years, I observed on the 16th of June, 1828; the thermometer placed in the earth rose on that day at noon (the wind being west, the weather calm and perfectly fine, and the temperature of the air in the shade 78° F.) to $153\frac{1}{2}$ F., and therefore $75\frac{1}{2}°$ higher than in the shade; it attained to nearly the same height on the 21st of June, on which day (with the temperature of the air $84\frac{1}{2}°$, and a brisk east wind) it rose to $151\frac{1}{4}°$, and therefore 66 ° higher than in the shade; on other days I remarked further that when the weather was windy, while the temperature was the same in the shade, the temperature of the earth in the sun rose to a less elevation. The smallest difference I ever observed was on the 11th of January, 1829, when there was a brisk east wind; the temperature I obtained in the shade on that day was, even at noon, 18° below the freezing-point, and the temperature of the surface of the earth in the sun rose only to $6\frac{3}{4}°$ above the freezing-point. The highest temperature observed in the Botanic Garden at Geneva, in the years 1796 and 1797, in contact with the surface of the earth, was 125°.4, which occurred on the 30th July, 1797:—

The highest, 3 inches deep below the surface	99°.5	July 26—29,	1797
The highest, 4 feet deep below the surface	73°.2	Aug. 1—4	,,
The lowest, 3 inches deep below the surface	23°.0	Dec. 12	,,
The lowest 4 feet deep below the surface	35°.8	Jan. 26 to Feb. 13	,,

The reason why the temperature observed at Geneva on the several days, in contact with the surface of the earth, rises to a less degree than at Tübingen, depends perhaps on the higher and probably more windy situation in which the thermometer was placed,—Geneva lying 1334 and Tübingen only 1076 English feet above the level of the sea; nor is it unlikely that the bulb of the thermometer at Geneva was rather deeper in the earth, and in a situation proportionally less warm, namely, exposed to a northern aspect.

X. *Capacity of Soils to develope Heat within themselves on being moistened.*—It has already been mentioned (in a former part of my 'Agricultural Chemistry,') that powdery substances in general, and consequently the earths, possess the property of developing warmth when moistened while in a dry state; and the results obtained on this subject with different bodies have been already communicated in a tabular form. We might suppose that this property in the case of the earths of the soil would be of important influence on the fertility of the land; this does not, however, appear to be the case. The earths develope warmth in this manner only when moistened after a previous state of perfect dryness; but, in nature, they are scarcely ever found in this perfectly dry condition; and even when dried artificially, the development of heat in the case of ordinary earths is always very inconsiderable, amounting in general to only $\frac{1}{2}°$ or 1° F.: even with dry humic acid and artificial turf-earth, I could detect no greater a development of heat. The falling rain in warm seasons is many degrees colder than the lower stratum of the atmosphere and the upper surface of the earth, which it immediately moistens; so that the earth in hot weather becomes rather cooled than otherwise by the rain; this property of the earths at the utmost can therefore have, perhaps, the effect of diminishing the cooling of the earth by rain some half or whole degree of Fahrenheit, when the earth previously has been very dry: such a result can have but a very inconsiderable influence on vegetation; and in the colder seasons, when the earth is already damp, so slight a development of heat must be inappreciable.

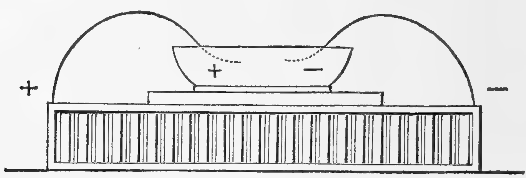
XI. *Galvanic and Electrical Relations of the Earths.*—The electrical relations of bodies stand in such manifold relations to chemical and organic processes, that the properties of the earths, even in this respect, deserve consideration.

Electric Conducting Power.—The pure earths, as sand, lime, magnesia, gypsum, in their dry state, are non-conductors; the clays, on the contrary, are imperfect conductors; and the compound clayey earths are weak imperfect conductors. The presence of the

moisture and of oxide of iron, which are found in all the clays, appears to be the principle of this phenomenon.

Power of exciting Electricity.—All the earths develope negative electricity when oblong dry pieces of them are scraped with a knife, and the resulting particles immediately received on the plate of an electrometer; the voltaic straw-stalk electrometer, by this manipulation, generally exhibits divergences of from 4 to 5 degrees: ice treated in the same manner gives positive electricity.

Polar-electric Relation.—When solutions of humus in alkalis and earths (the humic acid salts) are exposed to the current of the voltaic battery, decomposition immediately ensues; the humus, or peculiar humic acid, collects in brown flakes around the positive or zinc end of the apparatus, while the earths or alkalis



arrange themselves around the copper or negative end of the polar wire; humus, therefore, assumes in relation to the remaining earths the character of an acid, a circumstance which I pointed out, when I first made the experiment in the year 1817, in the fifth part of the Agricultural Journal of Hofwyl.

Influence of the simple Earths on the Germination of Seeds.—When we allow grain to germinate in the simpler earths, the young plants will, for some time, develope themselves as long as the earths possess the proper looseness and also remain sufficiently moist and at a proper temperature; conditions, which, according to what has been already said, on the capability of earths to become dry, must occur in different degrees; independently, also, of the moisture and warmth, the consistence of the earths has a great influence on the development of the germ; for if they have too great a consistence, the seeds lie in them without growing.

The several earths, in my investigations, exhibit the following differences in this respect:—

In moist siliceous and calcareous sand, the grains germinated in summer in a few days, and developed themselves well for some time, but suffered on the approach of hot weather.

In gypsum powder, the young plants became developed but indifferently; from the alternation of moisture and dryness, a crust

soon formed itself upon the surface, which the young plants could not break through without difficulty. As gypsum is in some degree soluble in water, this circumstance may easily contribute to the formation of the crust, since some portion of the gypsum becomes dissolved whenever moisture is applied, and again hardens on the evaporation of the water.

In sandy clay, no proper development took place; a radicle and plumule, about an eighth of an inch long, were indeed developed, but they soon died away before breaking through the clay, a crust having formed on the surface, through which the germinating seeds were unable to penetrate.

In the loamy and the stiff clay, the same phenomenon occurred, but in a more distinct manner.

In the pure clay, no development took place at all: even after fourteen days had elapsed, neither plumule nor radicle was to be seen, although during this period the due alternation of dryness and moisture had been properly maintained; in other respects, however, the seed-corn had not suffered by it, for when afterwards placed in a loose soil it grew very well. We thus see how it is that the seeds of many plants are capable of lying for a length of time undeveloped in the soil, and afterwards, at a later period, on being placed under more favourable external circumstances, of springing up.

In pure carbonate of lime, carbonate of magnesia, and slaty marl, as well as in pure humus, garden-mould, and arable-soil, the seeds germinated well; the young plants in warm weather developing themselves the most beautifully in the humus and in the carbonate of magnesia, in consequence, probably, of the greater power of containing water which these earths possess.

SYNOPTICAL VIEW of the most important PHYSICAL PROPERTIES of Surface of Cultivated Ground

KINDS OF EARTH.	Specific Gravity of the several Specimens: that of Water being 1000.	Weight of a Cubic Inch and Foot. In the		Power of containing Water. 100 parts retain of Water, according to		Firmness and Consistency of the Soil.		
						In the Dry State: that of Clay being = 100.0.	In the Wet State. Adhesion to a Surface of one square Foot.	
		Dry State.	Wet State.	Weight.	Volume.		Iron.	Wood.
				Per cent.	Per cent.		lbs.	lbs.
Siliceous Sand . { Occurring in almost every arable soil . }	2653	495 gr. 111.3 lbs.	605 gr. 136.1 lbs.	25	37.9	0	3.8	4.3
Calcareous Sand { Frequently occurring along with Siliceous Sand . . . . }	2722	505 gr. 113.6 lbs.	628 gr. 141.3 lbs.	29	44.1	0	4.1	4.4
Sandy Clay . . { A combination of 45 per cent. of fine sand, with 55 per cent. of clay }	2601	435 gr. 97.8 lbs.	577 gr. 129.7 lbs.	40	51.4	57.3	7.9	8.9
Loamy Clay . . { A combination of 24 per cent. of fine sand, with 76 per cent. of clay }	2581	393 gr. 88.5 lbs.	551 gr. 124.1 lbs.	50	57.3	68.8	10.6	11.4
Stiff Clay, or Brick-earth { A combination of 10 per cent. of fine sand, with 90 per cent. of clay }	2560	357 gr. 80.3 lbs.	531 gr. 119.6 lbs.	61	62.9	83.3	17.2	18.9
Clay, in its fine pure state { 58 per cent. of silica, 36.2 of alumina, with 5.8 per cent. of protoxide of iron }	2533	334 gr. 75.2 lbs.	515 gr. 115.8 lbs.	70	66.2	100.0	27	29.2
Lime, in its fine state of Carbonate . . .	2468	244 gr. 53.7 lbs.	460 gr. 103.5 lbs.	85	66.1	5.0	14.3	15.6
Magnesia, in its fine state of Carbonate .	2194	75 gr. 15.8 lbs.	339 gr. 76.3 lbs.	256	76.1	11.5	5.8	7.1
Gypsum-Powder, in its fine unburnt state	2331	408 gr. 91.9 lbs.	573 gr. 127.6 lbs.	27	38.2	7.3	10.7	11.8
Slaty-Marl (such as mentioned at p. 178)	2631	498 gr. 112 lbs.	624 gr. 140.3 lbs	34	49.9	23.0	4.9	5.5
Humus . { or Humic Acid, an essential ingredient of fertile soil. . }	1370	154 gr, 34.8 lbs.	346 gr. 81.7 lbs.	181	69.8	8.7	8.8	9.4
Fertile Garden-Mould (such as mentioned at p. 178) . . . . }	2332	364 gr. 68.7 lbs.	457 gr. 102.7 lbs.	89	67.3	7.6	6.4	7.5
Common Arable Soil (such as mentioned at p. 178) . . . . }	2401	376 gr. 84.5 lbs.	529 gr. 119.1 lbs.	52	57.3	33.0	5.8	6.4

Soil, in reference to Vegetation, as shown by those Earths of which the is most generally composed.

Capability of Drying. Water evaporated from 100 Parts in equal times.	Capability of Drying. Time required by equal Portions to Dry to the same degree.	Diminution of Volume on Drying. 1000 Parts lose in Volume.	Absorption of Moisture from the Atmosphere. 1000 Grains absorbed, in Hours.	Absorption of Moisture from the Atmosphere. 1000 Grains absorbed, in Grains.	Absorption of Oxygen Gas from the Atmosphere. In the perfectly Dry State.	Absorption of Oxygen Gas from the Atmosphere. In the Wet State. The Earths absorbed in 30 Days, from 21 per cent. of Oxygen Gas.	Power of retaining Heat. That of Calcareous Sand being = 100.	Power of retaining Heat. Length of time required by 30 cubic Inches of Earth to cool.	Warming of the Earths in the Sun. Temperature of their Surfaces (in the same general Temperature of the Air in the Shade). With Surfaces of the Natural Colour. With Wet Earth.	With Surfaces of the Natural Colour. With Dry Earth.	With Dry Earth. With White Surfaces.	With Dry Earth. With Black Surfaces.	Electrical and Galvanic Relations. Polar-Electric relation to Humus. (— negative, + positive.)	Electrical and Galvanic Relations. Power of Conducting Common Electricity.
Parts.	H. min.	Parts.				Per cent.		H. min.	°	°	°	°		
88.4	4 4	0	12 24 48	0 0 0	0	1.6	95 6	3 20	99.1	112.6	109.9	123.6	—	Non-conductor.
75.9	4 44	0	12 24 48	2 3 3	0	5.6	100.0	3 30	99.3	112.1	109.9	124.0	–	Non-conductor.
52.0	6 55	60	12 24 48	21 26 28	0	9.3	76.9	2 41	98.2	111.4	108.3	121.6	—	Imperfect conductor.
45 7	7 52	89	12 24 48	25 30 34	0	11.0	71.8	2 30	99.1	112.1	107.8	121.1	—	Imperfect conductor.
34.9	10 19	114	12 24 48	30 36 40	0	13.6	68.4	2 24	99.3	112.3	107.4	120.4	—	Imperfect conductor.
31.9	11 17	183	12 24 48	37 42 48	0	15.3	66.7	2 19	99.5	113.0	106.3	120.0	—	Imperfect conductor.
28.0	12 51	50	12 24 48	26 31 35	0	10.8	61.3	2 10	96.1	109.4	109.2	122.9	—	Non-conductor.
10.8	33 20	154	12 24 48	69 76 80	0	17.0	38.0	1 20	95.2	108.7	108.7	121.3	—	Non-conductor.
71.7	5 1	0	12 24 48	1 1 1	0	2.7	73.8	2 34	97.3	110.5	110.3	124.3	±	Non-conductor.
68.0	5 53	35	12 24 48	24 29 32	0	11.0	98.1	3 26	101.8	115.3	108.3	123.4	—	Imperfect conductor.
20.5	17 33	200	12 24 48	89 97 110	0	20.3	49.0	1 43	103.6	117.3	108.5	120.9	+	Non-conductor.
24.3	14 49	149	12 24 48	35 45 50	0	18.0	64.8	2 16	99.5	113.5	108.3	122.5	±	Weak imperfect conductor.
32.0	11 15	120	12 24 48	16 22 23	0	16.2	70.1	2 27	97.7	111.7	107.6	122.0	±	Weak imperfect conductor.

Comparative Review of these Results.—In the preceding Table I have brought the principal results obtained from the several earths into a comparative view, in order to show at once those different properties, the joint operation of which exercises so great an influence over the processes of vegetation. With respect to the different variations of these properties in the earths, I must refer back to the paragraphs in which they have been severally treated. This tabular arrangement will much facilitate the critical examination of the physical properties of the several kinds of soil, and may relieve others from the necessity of undertaking anew, in every examination they may wish to institute, those researches which I have myself often found both troublesome and tedious.

In the examination of soils, the determination of their power of containing water, and of their weight, consistency, and colour, in connexion with their chemical analysis, will, in the majority of cases, be sufficient to enable us to conclude, with great probability, as to their remaining physical properties. The more an earth weighs, the greater also in general is its power of retaining heat; the darker its colour and (at the same time) the smaller its power of containing water, the more quickly and strongly will it be heated by the sun's rays; the greater its power of containing water, the more has it in general the power also of absorbing moisture when in a dry, and oxygen when in a damp, state from the atmosphere, and the slower it usually is to become dry, especially when it is endued at the same time with a high degree of consistency; lastly, the greater the power of containing water and (at the same time) the consistency of a soil, the colder and wetter of course will that soil be, as well as the stiffer to work either in a wet or dry state, and the more judicious therefore will it be to break it up before the setting in of the frost, in order that its consistency may be improved by the due penetration of the frost during the winter; and, for the cultivation of many plants, the more requisite will it be found for the permanent improvement of such a soil, to counteract its too great consistency and power of containing water, by mixing with it looser earths, as lime, marl, and sand.

Note A (*referred to in page* 185).

On the Employment of the Power of Containing Water in the Examination of the Constituents of a Soil.—Cadet de Gassicourt, in modern times, has proposed what he considers an easy and practicable method for farmers to ascertain with great probability the fertility and constituents of a soil, founded on its power of containing water, and without their having recourse to chemical re-agents;* a method we cannot omit noticing in detail on this occasion, as many agricultural works have already referred to it, without however at the same time subjoining any accurate comparative trials of its practicability. We place 400 grammes (that is, a little more than 14 avoirdupois ounces) of earth, previously sifted and dried at 122°, on a filter of which the weight has also been found, and pour over it an equal quantity of water, observing the increase of weight in the moistened earth, and the time the water takes to pass through it: we repeat this experiment four times, and take the average of the whole. In order to obtain the probable fertility, we look into the following Table, and ascertain which of the calculations it is that the quantity of absorbed water, and the time of absorption, most nearly approaches: in order to be able to compare these results more nearly with those already given, I include in a column of the Table the power of containing water per cent. as calculated from these data:—

Quantity of water absorbed by 400 grammes, or 7527 grains.	Power of containing water per cent.	Time of the experiment, in hours.	Probable Constituents of the Earth.
Grammes.			
80 to 90	20 to 22	3 to 4	Almost pure sand, or with very little lime.
100 ,, 110	25 ,, 27.5	1 ,, 1½	Almost pure sterile limestone.
120 ,, 130	30 ,, 32.5	3 ,, 4	Light sandy earth, heath-land, with about ⅕th clay.
120 ,, 130	30 ,, 32.5	1 ,, 2	But little fertile, doubtless calcareous.
180 ,, 195	45 ,, 49	5 ,, 5½	Arid, and when grey probably calcareous.
180 ,, 195	45 ,, 49	8 ,, 9	Rather heavy soil, with almost ⅔rds clay.
240 ,, 250	60 ,, 62	9 ,, 10	Heavy, and without doubt very fertile.
320 ,, 350	80 ,, 87	11 ,, 12	Firm clay soil.
325 ,, 335	81.2 ,, 83.7	20 ,, 24	Almost pure clay.
350 ,, 360	87.5 ,, 90.0	7 ,, 8	Marl soil, calcareous sterile clay.
390 ,, 400	97.5 ,, 100	1 ,, 2	Vegetable garden-manure-soil, good to use as manure, or to mix with heavy soil or sand.

Let us compare the results of this Table with what has already been said on the power of the several earths to contain water, and

* Bibliothèque Universelle, section 'Agriculture,' tome 1, p. 97. Genève, 1816.

it will appear, that we may conclude, from this power of a soil, when it exceeds a certain fixed minimum or maximum, with great probability on the unfruitfulness of a soil; but that, with the soils which most frequently occur, and have a medium power of from 40 to 60 per cent., many cases present themselves in which, without the assistance of chemistry, we should remain in doubt as to the fruitfulness or unfruitfulness of a soil: since the fineness of the particles of earths has so considerable an influence on their power of containing water, we ought on that account only to be very doubtful in forming conclusions respecting their constituent parts. A power of containing water, of from 25 to 28 per cent., which, according to this Table, indicates a pure sterile limestone soil, might equally belong to a soil consisting of siliceous sand or gypsum powder; a power of containing water of from 60 to 62 per cent., belonging, as it most frequently does, to a fertile heavy soil, as given by the Table, may moreover apply equally to a clay soil (between a sandy clay and a loamy clay) without humus, and perfectly sterile; likewise a power of containing water of from 87 to 90 per cent., which this Table sets down as a marl soil or calcareous sterile clay, may belong to very fertile arable and garden soils, supplied with the due quantity of humus.

The minuter distinctions of the power of containing water, in the case of mixed earths, may be ascertained from the following comparison, in which I distinguish the fertile and the sterile earths, arranged according to their power of containing water by weight; subjoining to each kind, for the purpose of further comparison, a brief notice of its predominating materials, as far as they have an especial influence on that power, with remarks appended on its fertility, (the subject of the chemical elements of compound soils being treated more minutely in another section of my work.) The soils of the Rhein-Gau here given were examined, in reference to this object, by Professor Geiger, of Heidelberg;* those of the country of Göttingen, East Friesland, and Lüneburg, by Dr. Sprengel of Göttingen;† and the remainder by myself.

* Metzger's Rhenish Vine-Cultivation. Heidelberg, 1827, p. 225.

† Erdmann's Journal of Technical and Economical Chemistry, No. 4, 1829, p. 1, &c.

Power of containing Water.	KINDS OF EARTH.
20	VINEYARD SOIL of Rotheberg, near Gaissheim, in the Rhein-Gau—a great preponderance of siliceous earth, with particles of clay-slate, and some lime, with 3.3 per cent. of humus and volatile matter.
25	VINEYARD SOIL of Neudorf, in the Rhein-Gau, of similar composition, containing 5.2 per cent. of humus and volatile matter.
25	STERILE SANDY SOIL from the Vogelsang, near Göttingen—88 per cent. of sand and flinty matter, with some lime, clay, and 4.2 humus and volatile matter.
28	VINEYARD SOIL from Rüdesheim, in the Rhein-Gau—similar to the two first vineyard soils, with somewhat more lime, and 8.3 per cent. of humus and volatile matter.
35.5	VINEYARD SOIL of Liebfrauenkirche, near Worms — 66.5 per cent. of sand, with fragments of sandstone and slate, 19 per cent. of lime, some clay, and 8 per cent. of humus and volatile matter.
35.7	VERY FERTILE ARABLE SOIL of East Friesland—64.8 per cent. of (in a great measure) fine silica, 9.7 of lime, 5.7 of alumina, with 11.2 of humus and volatile matter.
37.0	VINEYARD SOIL of Johannisberg, in the Rhein-Gau — 54 per cent. of sand (consisting of particles of clay, slate, and quartz), 9 per cent. of lime, 37 of clay, and 5.5 of humus and volatile matter.
38.2	SANDY SOIL from the Black Forest—77 per cent. of quartz-sand, with 20.1 of clay, some lime, and 1.3 of humus and volatile matter: beautiful pine-forests.
40.7	VINEYARD SOIL from the superior vineyards in the valley of the Neckar, near Untertürkheim—60 per cent. of sand with slaty marl, 24.4 of clay, 12.7 of lime, and 5.6 per cent. of humus and volatile matter.
42.0	VINEYARD SOIL from the 'Golden Cup' at Steinberg, in the Rhein-Gau—44 per cent. of sand, and 56 of deposit; the latter consisting of clay, with 0.4 per cent. of lime, and 8.8 of humus and volatile matter.
46.7	FERTILE ARABLE SOIL from the corn-fields in the valley of the Neckar, near Tübingen, a calcareous clay land — 62 per cent. of clay, 28.8 of siliceous sand, 3.4 of lime, and 5.7 of humus and volatile matter.
49.2	FERTILE ARABLE SOIL of Göttingen—83.3 per cent. of siliceous sand, with (in a great measure) fine deposited silica, 5.1 of alumina, 1.8 of lime, and 5 per cent. of humus with volatile matter.

Power of containing Water.	KINDS OF EARTH.
49.2	STERILE CLAY-SOIL from the Lüneburg district—77.8 per cent. of siliceous sand and silica, 8.1 of oxide of iron (with much protoxide), 4.4 of humus and volatile matter, without carbonate of lime.
50.0	FERTILE ARABLE SOIL of the corn-fields near Stuttgart—70.6 per cent. of clay, 25.2 of siliceous sand, 1.2 of lime, and 7.8 of humus with volatile portions.
53.0	VINEYARD SOIL of Uhlbach, in the valley of the Neckar—50 per cent. of siliceous sand with slate particles, 46 of clay, 3 of lime, with 7 of humus and volatile portions.
61.3	FERTILE ARABLE SOIL of the corn-fields of the valley of the Neckar, near Tübingen—64.7 per cent. of clay, 17.2 of siliceous sand, 16.4 of lime with calcareous sand, and 9.8 of humus with volatile portions.
67.2	FERTILE ARABLE SOIL of the corn-fields near Schwenningen, at the source of the Neckar—63.6 per cent. of clay, 17.3 of siliceous sand, 4.1 of lime and calcareous sand, and 5.6 of humus and volatile matter.
78.1	GOOD MEADOW LAND of Bebenhausen—46.7 per cent. of clay, 46 of sand, 3 of carbonate of lime, and 4.5 of humus and volatile matter.
85	GOOD MEADOW LAND of Lustnau, in the valley of the Neckar—48 per cent. of clay, 20.8 of siliceous sand, 29.6 of fine lime with calcareous sand, and 6.3 of humus with volatile matter.
91.6	VERY FERTILE BLACK SOIL from the upper region of the Suabian Alps, on the Jura limestone—47 per cent. of clay, 1.2 of siliceous sand, 33.8 of calcareous sand with lime, 4.6 of soluble humus, and 13.1 of volatile portions.
100	LIGHT GARDEN-MOULD, abounding in vegetable matter and sand, excellent for the cultivation of heaths, proteas, and similar plants of the Cape—1.6 per cent. of lime, 18.6 of (for the most part) vegetable volatile matter; the remainder being sand, containing clay.
106	A GARDEN-MOULD, similar to the last, excellent for the cultivation of many of the New Holland shrubs, several kinds of the Metrosideros, Melaleuca, and similar plants—21 per cent. of volatile matter, with 15.5 of lime; the remainder being clayey sand.
124	VERY LIGHT SOIL, (but little adapted however for the general cultivation of plants,) from the valley of the Neckar, near Lustnau—42.7 per cent. of clay, 10.8 of siliceous sand, 38 of lime with much calcareous sand, 8.4 per cent. of humus with volatile matter; consistence, very slight.

Power of containing Water.	KINDS OF EARTH.
155	GARDEN-MOULD, abounding in vegetable matter, good for the cultivation of Azaleas, Vacciniums, the Daphnes and Rhododendrons, and similar plants —11 per cent. of lime, and 30 of volatile matter with clay and sand.
179	BLACK STERILE TURF-SOIL, containing much carbonized humus, and, in the whole, 76 per cent. of volatile matter.
203	VEGETABLE SOIL, formed from decomposed leaves, and therefore called leaf-soil; employed for the artificial composition of various garden-moulds — 33 per cent. volatile matter, with 16 of fine lime; the remainder being fine alumina and silica.
210	WOOD-SOIL, from decayed trees; employed, like the leaf-soil, in the formation of garden-moulds, in which various Cape and New Holland shrubs are intended to be grown—47 per cent. of volatile matter, with 10 of fine lime; the remainder being fine clay and silica.
366	VERY LIGHT STERILE BROWN TURF-SOIL, from imperfectly developed turf, containing 89 per cent. of volatile parts.

It results from this tabular view, that compound earths exhibit still greater differences in their power of containing water than could have been expected from the table of Gassicourt; the soils employed in the climate of Germany for the cultivation of corn appear to vary generally, in their power of containing water, between 40 and 70 per cent.: when such power is considerably greater or less, the soil is adapted much better for the cultivation of certain plants,—namely: if less, for that of the vineyards, and fir woods; if greater, for meadows, or the cultivation of individual families of plants, of which several instances are furnished by the preceding table: but there still remains much on this point to be established by more extended observation; and it will only be after much experience and varied experiments, that we shall be able to say with what power of containing water this or that plant will with most certainty attain its perfect state; the mean quantity of rain and the mean temperature of a country being necessarily of great influence on this point: in such warm countries as have also a small mean quantity of rain, those kinds of soil which have a great power of containing water will, if other circumstances are the same, be the best; while those soils which have, on the contrary, a small power of contain-

ing water will be found better suited for countries with a greater amount of rain. Those very soils, therefore, may be fertile for one country which become no longer so for another, under a change of external circumstances: the usual alternation of dry and wet years being, on the same principle, more favourable to the one or to the other country, according as their predominating soils respectively possess a greater or a less degree of this power of containing water.

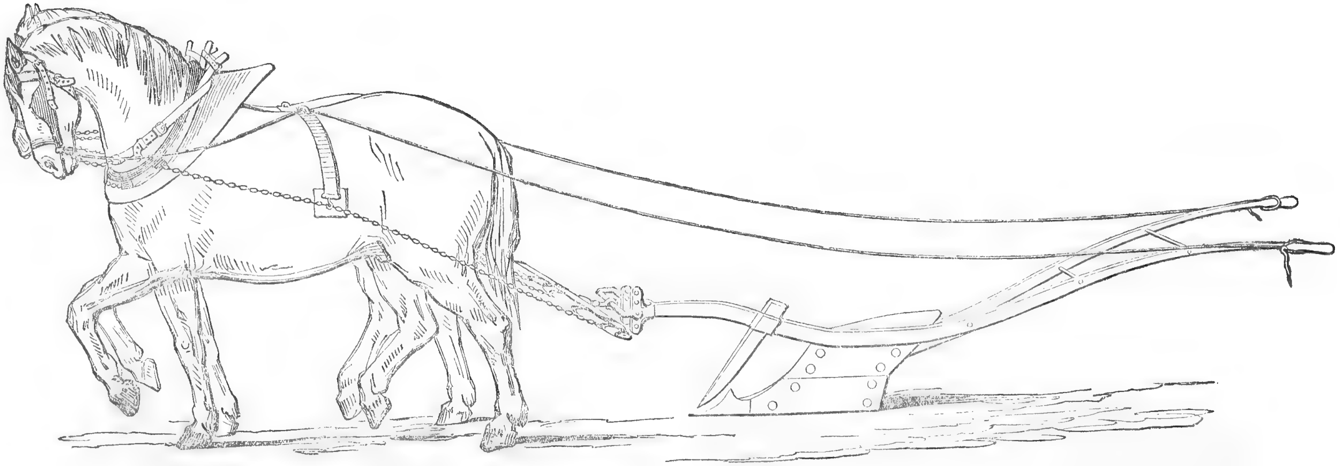
XXI.—*Experimental Inquiry on Draught in Ploughing.*—By PHILIP PUSEY, Esq., M.P., F.R. & G.S.

HAVING been led by the prize-essay of Mr. Handley to make some comparative trials of the draught of various ploughs, I beg to lay an account of these before the Society, in the hope that, if others should be induced to make similar inquiries, we may in the end obtain some certain results.

The first trial was made in last September, between an old Berkshire plough (with a high gallows in front, and a wooden mould-board), taken from one farm of the parish in which I write; a small one-wheeled wooden plough, with iron mould-board, made by Mr. Hart, of Wantage, in this neighbourhood, and employed on the other farm; the Rutland plough of Messrs. Ransome, which I selected because its draught was marked as the lightest in Mr. Handley's paper; and some other ploughs which I need not now particularize. The field was a clean oat-stubble, the soil a sandy loam moist with rain; the furrow 9 inches wide and 5 deep. The draught of the old Berkshire was about 3 cwt., of the Wantage plough less than 2 cwt., and of the Rutland plough somewhere between these two numbers. Thus it appeared that, within one small parish, the same work was performed on the one farm by two horses, as on the other by three (the smallest number ever attached to the old Berkshire plough), and that too with greater ease to the two horses than to the three. It was also a matter of surprise to me to find that even in this neighbourhood we possessed an implement lighter than any plough produced at the Oxford meeting by those distinguished manufacturers the Messrs. Ransome. Notwithstanding the encouragement thus afforded to further inquiry, it was necessary in the first instance to procure a better instrument than the dynamometer then employed, the same of which a figure is given in the last number of our Journal, p. 143, for the hand on the dial-plate moved so rapidly to and fro, in consequence of inequalities in the motion of the plough or of the horses (if the draft, for instance, was 2 cwt., the hand travelled faster than the eye could follow it between 1 and 3) that we could only judge the draught by observing the extreme points between which the hand varied, and any accurate observation of small differences was out of the question. I found, from Mr. Cottam, of the firm of Messrs. Cottam and Hallen, London, that this vibration was a difficulty which he had long wished in vain to surmount: but he at length suggested a mode of correcting the defect, which I am glad to say I have found completely successful in using the new draught-gauge which he made for me on that principle.

Before commencing the new trials I acquainted Messrs. Ran-

IMPROVED SCOTCH SWING-PLOUGH. FROM LORD MORETON'S EXAMPLE-FARM.



some that I had found in my own neighbourhood a plough of lighter draught than any of theirs in my possession; and they sent me two others, marked FF, precisely the same in all their parts with each other, excepting that one was a swing-plough and the other on wheels. Mr. Allan Ransome was so good as to assist me himself in a trial between his ploughs and Hart's, in which the numbers stood thus:—

	Cwt.		Stone.
Hart's	$1\frac{7}{8}$	*equal to*	15
FF, swing . . .	3	. . .	24
Rutland, NL . .	$3\frac{3}{4}$	. . .	30

Although these numbers were taken by an instrument which I think very imperfect, and were probably one stone too high, they give, I suppose, a fair comparative estimate of the draught of the ploughs as they then were: but it was suggested by a member of our Society, Mr. Harris, of Hinton, that Mr. Ransome's ploughs were rendered much heavier in draught by the coat of coal-tar with which their iron mould-boards had been covered, according to the practice of many makers of implements; and he undertook to polish their iron-work by using them in a gritty soil for two or three days before the final trial took place.

An opportunity was afforded me of adding to the implements to be tried two improved Scotch swing-ploughs, which Lord Moreton had lately imported from Scotland for his example-farm at Whitfield, in Gloucestershire. The gentleman who superintends that farm also offered to send up a pair of Clydesdale horses and a Scotch ploughman, and I was particularly glad to accept Mr. Morton's offer, because a fair trial was thus insured to these ploughs, of which Mr. Loudon says, in his 'Encyclopædia of Agriculture'—"There are now a great variety of ploughs, the best of which, for general purposes, is universally allowed to be what is called in England the Scotch plough, and in Scotland the improved Scotch plough:" and, in another place, "Of swing-ploughs, by far the best is the implement known in England as the Scotch plough." Mr. Morton was desirous also of showing what two good horses are capable of effecting upon heavy land.

The points of inquiry, then, towards which I was desirous of directing our trials were chiefly these:—

I. The comparative lightness in draught of wheel and swing-ploughs.

II. The lightest plough absolutely of whatever kind.

III. The effect of different soils upon the qualities, and chiefly on the draught, of the plough.

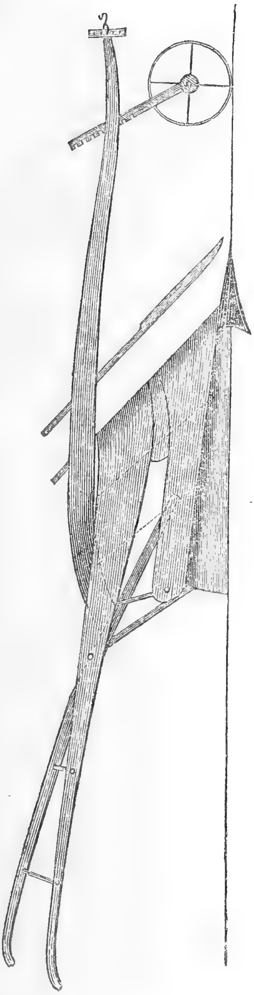
IV. The comparative tenacity of different soils; of which there is much variety in this neighbourhood.

V. The power of two horses to plough the strongest soil.

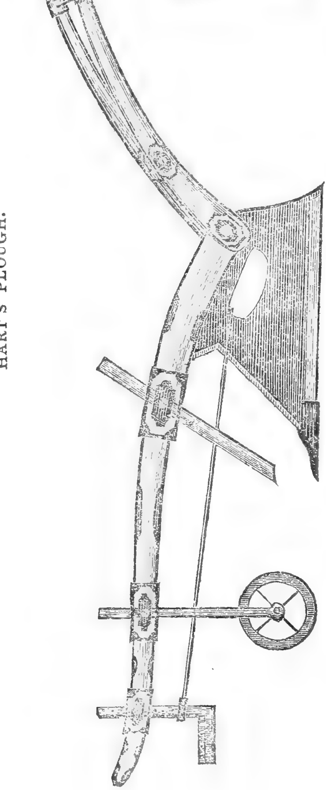
The ploughs put into the ground were as follow:—

1. An improved Scotch swing-plough, made by Mr. Ferguson, near Stirling, entirely of iron.
2. Another, by Mr. Clark, also near Stirling. These two were both remarkable for elegance of shape and general air of lightness.
3. A one-wheeled plough, of wood with iron breast, by Mr. Hart, of Wantage. The mould-board is not, as usual, of one piece, but consists of a turnfurrow, standing some inches from the ground, which piece, instead of being gently hollow, is almost flat and straight, and of a separate piece, called a ground-rest, which lies below and within the former, and serves to clear out the bottom of the furrow. This is our old construction in this part of the country, and this plough may be called an improved Berkshire plough.
4. Ransome's FF, with two low wheels, resembling his Rutland plough (a figure of which is given in Mr. Handley's paper), but of slighter proportions. This plough was originally constructed by him, in the year 1826, for market gardeners near London, to be drawn with one horse, but is now used as a two-horse plough on light lands in Cambridgeshire.
5. Ransome's FF; the same plough, but as a swing-plough.
6. A swing-plough, with wooden breast of the Berkshire construction, made by Mr. King, of Buckland; belonging to Mr. Throckmorton, and held by his ploughman, who had won a prize at our Faringdon Meeting.
7. A one-wheeled plough, of the same general shape, but much heavier, belonging to Mr. Williams, of Buckland. This plough, and the holder also, had lately won a prize at our local meeting.
8. The Rutland plough of Messrs. Ransome, which shows the lightest draught in Mr. Handley's paper.
9. An old Berkshire plough, of a very cumbrous appearance, with an extremely high gallows in front, entirely of wood.
10. Having since received a plough which came from Lord Leicester's agent, and which I am informed is the implement used on the Holkham property, I tried it upon this field, the ground remaining in the same state. It is a two-wheeled plough, with a light gallows.

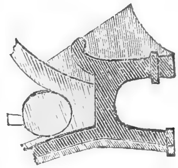
I will now give the successive trials, only observing that, in any remarks on the performance of the ploughs, I am stating not my own opinion, but those of several practical agriculturists who were good enough to assist me. With regard to the numbers indicating the draught of the ploughs, I was also aided by other observers; and such is the goodness of Mr. Cottam's new draught-gauge, that we scarcely ever, I believe, differed by more than a quarter of a hundred-weight, and often agreed to an eighth, or one stone. The numbers are therefore given in stones, as a well-known measure of the weights imposed on a horse.



KING'S WOODEN PLOUGH.



HART'S PLOUGH.



Section of Open-tail Iron.

Trial I.—*Nov. 6th.*

The field is a sandy loam, free in working when wet, as it now was; but, notwithstanding its lightness, a little adhesive of its kind, situated on the stone brash, as it is here called, though properly the coral rag; a clean wheat-stubble. The depth of the furrow was 5 inches by 9 wide; and these dimensions were carefully adhered to, as a person followed each plough in succession, measuring with a rule the depth and width of the furrow, and stopping the ploughman whenever there was any defect in these respects. The ploughs were drawn by two horses. The following numbers were noted down:—

		Furrow 5×9.
1.	Ferguson's improved Scotch swing-plough	19 stone.
2.	Clark's ditto	20
3.	Hart's improved Berkshire, one wheel	14
4.	Ransome's FF, two wheels	14
5.	Ransome's FF, swing	18
6.	King's swing	18
7.	King's one-wheel	17
8.	Rutland, Ransome's NL, two-wheels	17
9.	Old Berks	23
10.	Holkham plough, two-wheels	18
	Average	$17\frac{4}{5}$

On this trial we may observe,—

1st. What I found, with some surprise, that the Scotch ploughs were the heaviest in the field for the horses, except the old Berkshire, and more than 35 per cent. worse for them than the two lightest ploughs, which were Nos. 3 and 4.

2nd. That FF, which, on the same spot of ground, and with the ground in the same state of moisture, had been 24 stone, or 23 stone, allowance being made for the other draught-gauge then used, now that its mould-board was cleaned, drew 18 stone only. This appears to show the importance of preserving the plough-irons from being honeycombed, as we often see them, by rust.

3rd. Ransome's FF, as a swing-plough, was 4 stone, or 28 per cent., heavier than the same plough with its wheels on—a strong confirmation of Mr. Handley's opinion upon the subject; and it then equalled in lightness the plough of Hart's, with which it was sent to compete. King's plough worked better, by one stone only, with the wheel than without: but it must be remembered that it is a heavier plough.

4th. Putting the old Berkshire aside, the four easiest ploughs of the remaining eight were four distinct wheel-ploughs; and the four severest for the horses were four swing-ploughs.

5th. If we once more compare the two ploughs in daily use on this very soil, we find Hart's at 14 stone, and the old Berkshire at 23 stone: that is to say, worse by 2 stone for its three horses than Hart's for its two.

On land of this quality the Scotch swing-ploughs were evidently out of the question: at the invitation, therefore, of my neighbour and friend Mr. Throckmorton, we adjourned to some low strong ground of his near the Thames, in the parish of Buckland, partly with the view of trying the powers of the Scotch horses, and of ascertaining whether, as some suppose, there is no ground which two horses are unable to cope with.

Trial II.

This land was a clean bean-stubble, productive in dry seasons, a dark mould on a subsoil of blue clay. As it was laid up in high ridges, and the occupier stated that it varied in firmness, being easiest to work near the furrow where it was wet, we had some difficulty in finding a sufficient breadth of equal strength for the trial of the nine ploughs. We chose, however, the drier part of a land, and were permitted to throw the furrow-slice down from the ridge, instead of gathering it up to the crown, as we ought to have done in that stage of the cultivation: but to have done so, we were told, would have been the labour of another horse. At the desire of the very intelligent Scotch ploughman we went an inch deeper than in the last trial, making the furrow 6 inches by 9; that is, 6 inches on the land-side, for the ridge was so steep that there may have been an inch less of depth on the other side of the furrow. The Clydesdale horses behaved admirably, but it was soon evident that the attempt was a vain one. They struggled and floundered; and the other two pairs which succeeded them were much distressed, particularly the horses who were not in the furrow. The ploughmen could scarcely keep their ploughs in the ground. It became difficult, under these circumstances, to form a fair average of the respective numbers shown by the instrument, but the following Table contains the best approach we could make:—

Blue Clay in the parish of Buckland.

	Furrow 6 × 9 inches.
Ferguson's improved Scotch plough, swing	50 stone.
Clark's ditto	52
Hart's one wheel	43
Ransome's FF, two wheels	44
Ransome's FF, swing	44
King's swing	48
King's one wheel	43
Rutland, Ransome, two wheels	50
Old Berks	52
Average	$47\frac{1}{3}$

It appears from these numbers that here the Scotch swing-ploughs went backward in proportion to all the others, being, in fact, no better than the old Berkshire. This may perhaps be accounted for by the circumstance that they are made entirely of iron, for the farmers of this land are all of opinion that even iron mouldboards must not be used upon it, because this clay adheres so much more to iron than to wood. At the end of a very short furrow all the ploughs were more or less covered in every part with a thick coat of this very glutinous clay, which belongs to the formation called by geologists the "Oxford, or blue clay." It will be seen that in the FF, as a wheel or as a swing-plough, there was no perceptible difference; but no inference can be drawn from this circumstance as to the general question, because its very small wheels were completely clogged with the clay, and resembled two large balls of earth. The same was the case with the Rutland plough. I must mention, in order to show the errors which may arise in such trials from inequalities in the firmness of the ground, that this plough being placed in the low part of a second land the draught-gauge stood at 44 stone only, but rose to 50 when we returned to the top of the ridge, which was drier and more trampled. The two other ploughs, which are marked as the lightest, had each of them one wheel only, which ran of course on the unploughed ground.

The superiority of one plough over another was here much less than on the lighter ground, the difference in the first trial between the highest and lowest draught being in the proportion of 1 to $2\frac{1}{2}$, whilst in this very clogging land the distinction is not so much as between 4 for the easiest and 5 for the heaviest plough —I mean, of course, heaviest in draught.

There is one point only on which I consider this trial to be conclusive, that is, against those who maintain that there is absolutely no soil which may not be tilled by a two-horse plough. Here the ground was stated by the occupier to be in the most favourable state for working; it was a perfectly clean bean-stubble: we departed from the right course of management by throwing the furrow-slice downwards instead of upwards, yet the ploughmen, three of them accustomed to the land, were unable from the struggling of the cattle to keep their ploughs level; and as for the horses, it was almost cruel to make them turn the few short furrows required, though the three pair were put in by turns, and they did not go two hundred yards without resting; at a depth, too, not exceeding six inches.* It is true that we were two inches below

* I have myself witnessed the same fact on a clay-land farm in the low lands of Surrey, where as fine a pair of cart-horses, of the Lincoln breed, as were ever whipped, worked in a Scotch swing-plough, held by a

the usual depth of cultivation, and I had thought that this might be some disadvantage to the ploughs, but I am informed that, on the contrary, the solid subsoil when brought up tends to remedy the disposition of this soil to roll onward before the plough, instead of falling regularly on the side. This field is as I have mentioned on the Oxford clay formation, which extends in a narrow belt from about Crewkerne, in Dorsetshire, by Frome, Malmesbury, Oxford (whence it takes its name), Bicester, Newport Pagnell, running near Bedford, where it becomes wider, and occupies a large space, with Peterborough at its northern end, Huntingdon and Higham Ferrers on its eastern and western borders, appearing again afterwards about Market Deeping, and extending due north by Lincoln, up the Humber.

If this field be a fair specimen of the toughness of the Oxford clay, we may safely say that, except where it is covered with gravel, the two-horse plough is inapplicable within that district: if it be not, it is desirable to know in what parts of its range this very obstinate clay becomes freer.

It may be remarked that, if we take the average draught of all the ploughs in each of these trials, we shall find that it was about 18 stone in the first, and in the second 47, much more than double. This variation is within a space of two miles. Horses and men having now had enough to do, returned home.

Trial III.—*Nov.* 7.

It has been mentioned that one main distinction in the trial ploughs lay in the shape of the breast which moves the earth towards the side, that of the Scotch ploughs and of Messrs. Ransome being a gentle hollow curve, founded on those mathematical principles which were applied by Mr. Jefferson, President of the United States, in his paper on the true shape of the mould-board, addressed to the French Institute—and, before Mr. Jefferson, by an English ploughwright, at Rotherham, in Yorkshire—and that of the four Berkshire ploughs being full, straight, and short, not raising the mould gradually like a wave, but throwing it over at once. As it is generally stated that the hollow form of the breast is most adapted to sandy ground, I determined on this day,

very experienced ploughman from the Lothians, could not, in such weather, make any impression on the soil. A third was added, but the team, after struggling for a short distance, was at length brought to a dead standstill; and the land, which was a wheat stubble, was afterwards broken up with a Kentish turn-wrest, drawn by five horses in line. They, however, did the work well; but I am persuaded that no swing-plough could have been made to keep an even furrow in such a soil, in the condition stated.—F. Burke.

in order to give the Scotch ploughs their fair advantage, to try them on the most sandy land that could be found; and we selected a very free brown loamy sand of good quality, without stone, gravel, or clod, resting on a pure yellow sand (it was then a clean wheat-stubble), in the parish of Hatford, on the coral rag formation. As in consequence of bad weather we were unable to make more than one trial, we enlarged that one by making each plough turn four furrows, at the depth of 4, 5, 6, and 7 inches respectively. The following Table gives the numbers shown by the draught-gauge:—

	Inch. Furrow 4 × 9	Inch. 5 × 9	Inch. 6 × 9	Inch. 7 × 9.
1. Ferguson's improved Scotch plough, swing	18	19	19	22
2. Clark's ditto	17	17	18	21
3. Hart's improved Berks one-wheeled .	11	12	16	18
4. FF, Ransome's two-wheeled . .	12	13	18	21
5. FF, Ransome's swing . . .	16	16	18	21
6. King's swing	15	15	18	20
7. King's one-wheel	16	17	21	23
8. Rutland NL, two-wheel . . .	16	16	18	20
9. Old Berks	21	21	24	31
Average . .	$15\frac{7}{9}$	$16\frac{2}{9}$	$18\frac{8}{9}$	$21\frac{8}{9}$

The Scotch ploughs, notwithstanding their hollow breast, appear still to great disadvantage in the 4-inch furrow, and also in the 5-inch one, (the usual depth of ploughing upon this ground,) whether compared with King's swing-plough or with Hart's wheeled one. The latter plough on this land might be drawn by one strong horse; it still maintains a slight superiority over its competitor, FF, with wheels, and the latter again a considerable one, 25 per cent., over its duplicate as a swing-plough, excepting at the lower depths, where the wheels, from the lowness of the beam, had not room to turn. At the greater depths, however, of 6 and 7 inches, all the ploughs, excepting the old Berkshire, approach each other more nearly, which agrees with what we found yesterday on the heavy ground, that, where the resistance of the soil is much increased, the qualities of the plough benefit the horses in a slighter degree. It will be observed that the same numbers sometimes appear in two columns for the same plough, though the furrows are of different depths. This must arise from some inequality in the firmness of the land, which it is very difficult to avoid in selecting the ground. It should be remarked that the Scotch ploughs increase very little in draught as they go deeper; indeed, these ploughs appeared throughout to most advantage when they were low in the ground. The Rutland alone resembles them in this respect on the present trial. The old Berkshire shows, on the

other hand, a singular want of pliancy for adapting itself to deep ploughing.

It will be seen by this table that on sandy land, at least, the draught increases but slowly when the furrow is deepened. As this is an important point in the practice of husbandry, and as it is laid down, on the contrary, in our books that the draught increases rapidly, or, in mathematical terms, according to the squares of the depth,—that is to say, that if the draught at 4 inches be 18 stone, at 7 inches, it will be as 49 to 16 or 54 stone, I put the question again to the test two days later, upon a poor moory soil, with Ferguson's Scotch plough. We began with a 5-inch furrow, and went lower each furrow until the plough was a foot in the ground. The increase of draught was as follows:—

Furrow 9 inches wide. Depth in Inches.	Draught in Stones.
5	23
6	22
7	25
8	30
9	31
10	40
11	50
12	50

This is a difficult experiment to make, and some of the numbers show that we did not succeed always in keeping the proper depth of our furrow. Still they are near enough to prove that the law of increase laid down in books is altogether erroneous; since, if that were the true rate, the draught at a foot would have been not 50 stone, but 132.

To return, however, to the table which contains the numbers marked in our third trial, no inference can be drawn from it as to the right shape of the plough's breast, hollow or full, for sandy land; but, as a proceeding adopted on the next day seems to throw some light on this point, I will mention it here. It occurred to me that there might be a considerable difference in the draught of the plough, independent of the ease with which it severed the ground and threw over the furrow-slice. I accordingly desired each ploughman after ploughing the trial-furrow to pass over a certain space of unploughed ground, when the draught was taken down from the draught-gauge, and the same thing was done on another day by passing the plough along the empty furrow. The draughts of the wheel-ploughs are given below from the first trial as the fairest for them; those of the swing-ploughs were the same in both cases. I add the weight of the ploughs, taken as nearly as I was able to estimate it with the means in my power.

	Surface Draught, in Stones.	Weight of Plough, in Stones.
1. Ferguson's swing	12	15
2. Clark's swing	12	15
3. Hart's wheel	3	12
4. FF, wheel	8	$13\frac{1}{2}$
5. FF, swing	10	$10\frac{1}{2}$
6. King's swing	8	8
7. King's wheel	6	10
8. Old Berks wheel	8	
9. Rutland, wheel	8	15

The first thing which struck me in the numbers of the first column is the very large proportion of labour which the mere dragging of the implement bears to the whole task of the horse. The entire labour incurred by a pair of horses in making a 5-inch furrow on the sandy land of this day's trial, with Clark's Scotch plough, is 17 stone; and since 12 stone of these are given, as we see, to the plough itself, 5 stone only can be required for cleaving and turning over the soil, the real object to be performed. It is a striking fact, that, upon such land, it costs the horses as much labour to move the Scotch iron swing-ploughs along the surface as to plough the ground at 5 inches with Hart's one-wheeled plough, namely, 12 stone in both cases. At 4 inches Hart's plough working draws but 11 stone.

But further—since, if we deduct the surface-draught of a plough from its draught when at work, the remainder represents the power which it causes the horse to expend in moving a given portion of soil—it appears that by making this calculation for several ploughs we should be able to compare the merits of those parts of them which act on the land. I took, therefore, the draughts of the ploughs in cutting a 5-inch furrow on the sandy field at Hatford, and subtracted from each their surface-draughts respectively:—

	Gross Draught in Furrow 5 × 9.	Surface Draught which is to be deducted.	Remainder or working Draught.
1. Ferguson's	19	12	7
2. Clark's	17	12	5
3. Hart's	12	3	9
4. FF, wheel	13	8	5
5. FF	16	10	6
6. King's swing	15	8	7
7. King's wheel	17	5	12
8. Rutland	16	8	8
9. Old Berkshire	21	8	13

Here the situation of the Scotch ploughs and of Hart's is strikingly changed. When at work the two former were half as heavy again as the latter: it now appears, however, that this great

disadvantage arises not from their concave mould-board, or from any defect in the shape of their cutting parts (on the contrary, upon sand they produce the same effect with a power of 7 or of 5 stone as Hart's does with a power of 9 stone), but from some cause which makes their own weight tell heavily on the draught. It appears, too, that the four easiest ploughs in this point of view have hollow breasts, the four heaviest full breasts. Still it must not be forgotten that the trial is on sand, to which the hollow breast is considered to be most adapted. It appears, too, that of the two competitors, Hart's and Ransome's wheeled ploughs, one is singularly easy above ground, and the other below, so that a lighter plough than either for light ground might possibly be formed by combining their peculiar merits. I must add, however, that, although the principle of this calculation generally is simple enough, I am not confident in the details which I have given, because, in repeating the trials as to the surface-draughts of two or three ploughs, they varied much according to the nature of the surface, and also because, excellent as is Mr. Cottam's new draught-gauge, I am not sure that it is quite correct before it reaches 8 stone, or 1 hundred-weight.

Trial IV.—*Nov.* 8.

Although the pair of Scotch horses, and, still more, the other pairs, had been defeated, on the first day, by the heavy clay, it was fair to afford them another trial with stiff land of a less obstinate kind than that with which they had then endeavoured to cope. It had been also the principal object of Mr. Morton to prove to two farmers in the neighbourhood that their strong ground, which was usually worked with four horses, might be ploughed by two only. The first field, therefore, which we entered on was a deep strong loam, in the parish of Charney, very good for all kinds of crops, resting upon yellow clay, at that time a clean bean-stubble. It offered great resistance to the plough, as the following numbers show. The furrow was 5 inches by 9.

	Furrow 5×9
1. Ferguson's swing	35
2. Clark's swing	33
3. Hart's one-wheeled	23
4. FF, with wheels	33
5. FF, swing	30
6. King's swing	27
7. King's wheel	30
8. Old Berks	36
9. Rutland, NL	36
Average	$31\frac{4}{9}$ stones.

The superiority of Hart's one-wheeled plough, in lightness of draught, over the two Scotch ploughs, and indeed, more or less, over all the others, continued, it will be seen, as before. That of the FF, with wheels, over the same plough as a swing, did not continue, but was reversed: the cause appeared to be, that both its wheels were clogged with dirt, the land-wheel, though on a tolerably firm surface, through its small size; the furrow-wheel, though of course larger, from collecting the loose dirt in the furrow. The same causes affected the Rutland plough, and I suppose King's also, but I omitted to observe this plough at the time. Hart's was exempted by its single wheel, of a better size, running on the unploughed surface, The Scotch horses worked without signs of distress on this ground. We next proceeded to a field which had been selected by the occupier, a member of our Society, Mr. Brooks, of Lyford, as being peculiarly calculated to try the powers of the pair of Scotch horses.

Trial V.

Much interest was attached to this trial, and several neighbouring farmers had come to witness it. The surface of the soil is more a clay than a loam, of moderate fertility, resting on a decided clay, known to geologists as the Kimmeridge clay. We found in the field four strong horses at work in line according to the general practice, drawing an old Berkshire plough, and having evidently enough, though not too much, to do. The draught-guage when applied showed that in a 5-inch furrow they were exerting a power of 4 cwt., or 32 stone, and in one of 6 inches, 2 stone more, 34 stone.

	Furrow 5 × 9	6 × 9
Old Berks	32	34

The next plough tried was Ferguson's, with its two horses, which showed a draught of 3 cwt. only in the 5-inch furrow, exactly one horse less. The state of the land, which was extremely wet from heavy rains, was very disadvantageous to the pair of horses, since, though the ground was easier for the plough, it was in a greater proportion difficult for the horse who was upon the unploughed land, into which he sank four inches at every step. One clear result, however, appeared already, that even if 2 horses abreast were not enough, 3 horses in line with Ferguson's plough would have exactly the same work to do as the 4 horses whom we found drawing the old Berkshire plough.

	[5 × 9	6 × 9
Ferguson	24	26
Clark	27	30
Hart	30	28
FF, swing	24	26

Here it will be seen that Hart's plough, for the first time, lost its advantage. The fact is, however, that unless to carry out all the trials with all the ploughs, we should not have worked it at all, as the surface was so very soft, that the wheel instead of governing the depth of the plough's action, sank itself, and dragged through the soil like a coulter. Unfortunately, it did not occur to me that this wheel might be taken off and the implement be tried as a swing-plough. The FF plough with wheels was put into the ground, but, for the same reason, it would not go at all. It was now suggested by the practical farmers that the unploughed ground having been trampled by the land-horse, (for the question with them was not so much the comparative lightness of the different ploughs, as the possibility of employing 2 horses abreast instead of 4 in line,) the draught of the Scotch plough would probably be increased beyond the fair exertions of its horses. Ferguson's plough was accordingly put in again, and their expectations turned out to be so far correct, that its draught did stand much higher.

	5 × 9	6 × 9
Ferguson's, on trodden ground	31	33
King's wheel	35	33
King's swing	24	27

This last plough, however, it will be seen, worked at as low a power on the trodden land as Ferguson's in its first trial on the fresh ground; but it had been besides objected to the Scotch ploughs that their furrow was shallower by an inch on the right hand than on the left. Now, the furrow drawn by King's plough was declared to be far the best which had been yet made, and indeed I could myself perceive that it was perfectly flat, clean, and square. The plough was considered by the occupier of the land as particularly well suited for its cultivation, and it should be remembered that its draught is to that of the implement hitherto used as that of 3 horses to 4. It has the open mould-board, as it is here called, or turn-furrow and land-rest which have been already described; the turn-furrow is flat, and both parts are not of iron, but of wood. The Rutland plough followed, and was also allowed to make an excellent furrow: its draught indeed was greater, but the wheels were too much clogged for a fair trial, and it was thought that in drier weather it might be a very good plough for this land.* Ferguson's was put in once more, and was rather lighter than on its second trial.

* A Rutland plough has since been employed regularly on this farm, and is preferred by the occupier to any plough he has tried, on account of the excellence of its work.—Ph. P.

Summary of Trial.

	5 inches.	6 inches
Old Berks	32	34
Ferguson's	24	26
Clark's	27	30
Hart's	30	28
FF, swing	24	26
Ferguson's (2nd trial, ground trampled)	31	33
King's wheel	35	33
King's swing	24	27
Rutland	29	31
Ferguson's (3rd trial)	28	27 *
Average	$28\frac{2}{5}$	$29\frac{1}{2}$

The Clydesdale horses were greatly admired by all who saw them at work. They unite power and bone with the elastic action of a blood-horse: they stepped regularly together, and were guided by the ploughman, by the voice, almost without the use of the reins. It was generally admitted that no such horses had been seen in our part of the country; and the excellence of the ploughman was, I think, admitted to be equally great. I think I may add that, in the opinion of the bystanders, this land, usually worked with four good horses in line, might be ploughed by two such horses, in such condition, abreast; though, it was said, that it would cost as much to keep the two horses in that condition as to support the four in their usual working state. I am the more induced to think that they would be equal to the undertaking, because the ploughman assured us that it was exactly such land as this, and no other, to which he had been accustomed in Scotland, there called carse-land, and had ploughed always with two horses: he said, indeed, that it was there rendered somewhat lighter by being thoroughly drained. The only doubt arose from the softness of the unploughed land on which one horse had to walk. As to the draught, it was less than in the last trial, though the land was a more decided clay; and on that ground where the land-horse had a firm footing, the pair had worked apparently with perfect ease.

Trial VI.—*Nov. 9th.*

Our last trial was made on a very poor damp moory soil, which I selected as being perhaps the kind of ground on which the

* It may be observed that, in several instances, a lighter draught is marked in the second column than in the first. The occupier, Mr. Brooks, accounted for this variation by the circumstance that the deeper furrow was on the north, and the shallower on the south side of the ridge, or land; the north side being, as he stated, always rendered lighter to plough by the stronger action of the frost upon it in winter.—Ph. P.

Scotch ploughs might excel. It was rather retentive of surface water, though crumbling even in its present state. In summer, when tilled, it falls to powder. It was a grass ley, but the roots of the herbage could offer little resistance to the plough, as the greater part had been thrown out of the ground in previous winters, and the surface was more than half bare. The numbers were as follow :—

	5 inches.	6 inches.
Ferguson's swing	23	22
Clark's swing	23	22
Hart's one-wheel	16	18
FF two-wheel	14	16
FF swing	21	23
King's swing	19	20
King's wheel	18	19
Rutland two-wheel	21	22
Old Berks	25	28
Average	20	$20\frac{7}{9}$

It will be seen that the Scotch ploughs did no better here than elsewhere; in fact, they did worse, since they were heavier than all the other ploughs brought into competition, the old Berkshire being out of the question. They were half as heavy again in their draught as the two lightest ploughs. The numbers also show that, in this instance only, Hart's plough was beaten by its competitor FF, with wheels; which last I am bound to admit, after a repeated trial, was, on this particular soil, better by two stone than Hart's. It will be seen how much this plough lost here, where the surface was firm, on being worked without wheels, its draught rising from 14 stone to 21; that is, being increased by exactly one-half. King's wheel-plough, for the same reason, beat his swing-plough, at both depths, though to a much smaller extent.

Although there are several other varieties of soil in this neighbourhood which I should have been glad to have tried, yet, as I could no longer detain the Clydesdale horses and Scotch ploughs, I was obliged here to close the comparative trials. They are limited in many respects: first, as to the number of the ploughs; secondly, the kinds of the soil; thirdly, the state of the soil, which was throughout very wet (it would be, of course, desirable to try each soil in a state of wetness, of moderate moisture, and dryness); fourthly, they were all but the last on clean ground; and, finally, they were first ploughings only; but it would be also well to know the draught of ploughs in other stages of cultivation. So far as they go, however, they appear to lead to these inferences:—

1. With regard to the question of wheel and swing ploughs,

wherever the soil is firm enough to bear up the wheels, they appear to me to be advantageous: the best plough, therefore, will be one, the wheels of which can be taken off or put on, according to the state of the ground; and as, where there is one wheel only, it will be on the unploughed ground, where it will be less likely to become clogged, one wheel only is probably better than two.

2. It may be fairly said that the lightest plough in these trials was Hart's, though Ransome's FF ran it exceedingly near, and beat it in the last trial. The best and lightest plough on a wet clay was King's swing, with a wooden mould-board. Hart's plough on our lighter land goes as easily with 2 horses, and King's on wet clay with 3 horses, as our old Berkshire, with 3 horses on the former ground, and with 4 on the latter. These 2 ploughs have the open mould-board, but how far that contributes to their excellence I cannot discover. Ransome's Rutland plough appears to be a very good implement, the Scotch swing-plough to be the heaviest of all the modern ploughs which were tried, not to make a clean furrow, to be out of the question upon any light soil, and to be by no means the best upon a heavy one.

3. As to the effect of different soils upon the working qualities of the ploughs, the trials were too limited, and my own inexperience too great, for me to offer any opinion upon this point.

4. With regard to the different tenacity of soils, the following Table contains the average draught of all the ploughs on each of the different fields:—

		Average Draught at 5 inches by 9.	Geological Situation.
Trial 1.	Sandy loam	$17\frac{4}{5}$ stone	Coral rag.
,, 2.	Clay loam	$47\frac{1}{3}$* ,,	Oxford clay.
,, 3.	Loamy sand	$16\frac{2}{9}$,,	Coral rag.
,, 4.	Strong loam	$31\frac{4}{9}$,,	Kimmeridge clay.
,, 5.	Clay loam	$28\frac{2}{5}$,,	Kimmeridge clay.
,, 6.	Moory soil	20 ,,	Alluvial gravel.

The coral rag shows a tenacity of 17 stone only, while the Kimmeridge clay on its south stands at 30, and the Oxford clay on its north at 47. It is on the middle band, however, of the upper oolite that the trials were made; on either edge where it approaches the clay formations it becomes tougher. The most remarkable point, however, seems to me to be the difference between the two districts of clay, one of them being worse by one-half to work than the other, although there is no observable distinction in their general appearance.

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* This furrow was 6 inches deep on one side, but the furrow-slice was thrown downwards.

There remains one other question to which our trials were directed—the extent to which the two-horse plough can be made use of in husbandry. As far as regards light loams, the answer in the district where the trials were made is easy: the horses have been hitherto harnessed two abreast, with a leader in front to a heavy plough. It appears that we have a plough one-third lighter in draught than the old implement. The only change required is to adopt that plough, to remove the leader, and to place reins in the hands of the ploughman: this change has been gradually spreading among our farmers for some time, and of late so rapidly, that on such soils it will soon, I hope, become general.

On heavy lands, the answer is by no means so easy, because it appears that there are some of them, one at least, the Oxford clay, beyond the power of two horses; and because here we have to substitute two horses not for three but for four, two horses abreast instead of four in line; so that a greater change is to be made; and on these soils too the more important, because the unploughed land may not be in a state to bear up well one of the pair. It appears, however, that on the Kimmeridge clay (Trial V.) a plough was found which required three horses only in line, where the old plough required four; their respective draughts being 3 and 4 cwt., or 24 and 32 stone. The question then which remains, is, whether two horses abreast can, on this land, be made to do the work not of four but of three horses in line. As it is a question of interest, I will beg to lay before the Society, as shortly as possible, such information as I have been able to obtain on the subject, after taking all the means in my power. The Scotch ploughman stated, as a general opinion in his own original district, that two horses abreast have as much power over the plough as three horses in line, because their purchase over it is greater in that proportion. Now, though we have no means of bringing this point to any nice measurement, there are grounds, I think, for supposing that the advantage so gained is considerable. The horse appears to be much less capable of exerting his strength in a level direction, that of drawing, than in an upright one, that of carrying. In these trials I sometimes observed that my own horses, rather strong ones, but not in working order, were a little distressed by drawing once up and down a short furrow, at a brisk walk, with a draught of only 24 stone between them. It could not be supposed that a strong cart-horse would feel the weight of a rider of 12 stone, at a walk, for that trifling distance: the pack-horses of Yorkshire used to carry, I find, loads of 30 stone for a day's journey over the highest hills of the north. It is well known too, that, with ourselves, much depends on the direction in which we exert our muscles. I believe that a man can put forth, without greater fatigue, three times more of his strength in row-

ing a boat than in towing it from the bank. The nearer the horse is brought to the plough, the more he will draw upwards, and the more of this advantage, whatever it be, he will obtain. The two horses are in general brought as near to it as is consistent with the freedom of their hind legs. There is, however, in the Scotch harness, a contrivance by which the line of draught is shortened still more, and to which Mr. Morton justly, I think, attaches much importance. In this neighbourhood, the trace of the horses is not supported on their back, but passes in a straight line from the point of their shoulders to the beam of the plough: so that they draw, of course, from the shoulder. I do not know whether this is general; but it is certainly figured so in many works on agriculture where this question of draught is treated; and treated, I must say, most inconclusively. But, in the harness of these Clydesdale horses, who worked here so admirably, there was a back-band of strong leather, $3\frac{1}{2}$ inches wide, moveable along the back of the animal to different points, which carries the traces level from the collar; so that the line of draught is shortened considerably, and the horses work at the same time from the back with an uplifting power, and from the shoulders with an advancing power. The advantage thus given may, I think, be very considerable; indeed, no one will regard the direction of a horse's exertions as a slight matter, who recollects that extreme case in which, as Sir David Brewster informs us, a strong man discovered that, by placing himself in a certain posture, he could withstand the efforts of two horses pulling against him.

But there is even another circumstance which may render a short draught advantageous in ploughing, and I will merely mention it in the hope of drawing the attention of mechanicians to a subject on which I must say I have not found in books anything satisfactory: I mean, that an uplifting draught may be best suited to the force which it is the object of the plough to exert. For that force is an uplifting one, as regards the earth to be raised, as well as an advancing one, as regards the progress to be made by the plough itself along the furrow. It appeared, too, in Trial II., that the friction arising from the plough's own weight occasions a large part of the force which the horse has to expend; but the more the horse draws upward, the less of course will the plough press on the ground. I leave this point, however, to be considered by those who are able to discuss it on mathematical principles, and return to the immediate question, how far two horses abreast can, with the same plough, do the work, on strong land, of three harnessed in line.

The two Clydesdale horses were, I think, able, at Lyford, with as little exertion, to draw King's wooden swing-plough, which showed a draught of 24 stone, as were three horses of

about equal substance in line. But, whatever advantage they may have gained from being both next to the plough, or from their back, band, I must admit that much is to be attributed to the superiority of their breed, and also of their condition, which was so high that, as has been already mentioned, it was even said the pair must cost as much to keep in that state as the ploughing-team of four, whose place they would have to supply. This question of expence being a most material one for the practical farmer, I requested information of Mr. Morton, as to the cost which Lord Moreton had incurred in the keep of five pair of Clydesdale horses on Whitfield farm, in Gloucestershire; and that gentleman was so good as to supply me with an account of it from the farm books. My friend Lord Moreton's horses certainly appear to be extremely well fed, their allowance being hay and four quarterns and a half of corn each day, of which one-sixth part is beans and the rest oats. I believe that the medium allowance of our horses, on the other hand, is cut chaff, with one bushel of corn weekly. The expense of feeding each horse for the summer half year was 18*l.* or 36*l.* for the year. The expense of a farm-horse in this neighbourhood is reckoned, I believe, at 25*l.* The pair, therefore, at 72*l.* yearly, would be about as expensive as our 3 horses at 75*l.* It is true these Clydesdale horses are worth their keep, for it appeared to me, during the trials, that their fair work was at least a draught of 12 stone, while that of our own is certainly not more than 8, so that the pair equals the three in the work (24 stone) as well as in the expense of their keep: still there is no saving, which is the question we are now considering. There would be a saving in substituting a plough of 3 cwt. for one of 4 cwt., and thus reducing the actual team of four horses to three: there would be no saving, so far as we have yet gone, in substituting the Clydesdale pair for the remaining three, since the expense of keep would be the same for the two horses as for the three.

There is, however, one more point to be considered—the pace of the horses—the most important point, in fact, since it is the same thing with the quantity of work done in a day. It was impossible not to observe the superior quickness of the Clydesdale horses at work, and on inquiring of the Scotch ploughman, I learnt a fact, since confirmed by Mr. Morton, which completely turns the balance of expense as well as power in their favour, namely, that while the work of our ploughing teams is at best three quarters of an acre upon strong ground (and sometimes as much as an acre upon the lightest), the daily task performed by these Scotch horses, upon strong land, is one acre and a quarter; and this quantity, or one acre Scotch, he stated to be the usual

day's work in his native district.* If these numbers be correct, as I have every reason to believe that they are, it is clear that the saving effected by these high-kept nimble horses must be very great; so great, indeed, as almost to make one mistrust the calculation. Still it does appear that since a pair of the Clydesdale breed, kept at the same expense as three of ours, can plough five quarters of an acre where our teams get through three quarters only, three 2-horse ploughs at work on a farm where Clydesdale horses are kept, are equal to five 3-horse ploughs of our own. Nay, if good ploughs be used by the former, and bad by the latter, are equal to five 4-horse ploughs. I am bound to state the facts according to the information conveyed to me, while I fully admit that without further inquiry we cannot be satisfied that we have an accurate view of the matter. I must, however, observe that it is no question of theoretical calculation, but rests upon facts which may easily be ascertained. Do the Clydesdale horses in their own country plough in single pairs, with the Scotch plough, which appears to be a heavy one, land of the same toughness with that which is here usually worked by four horses in line? Could they work that land easily with a good swing-plough, which would require three of our horses in line? Is their daily task on such land one Scotch acre or one and a quarter English, and is the labour performed by our own limited to three quarters of an English acre? If these facts be correct, it follows, of course, that 6 horses so kept are equal to 15 horses that work with a good

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* The following communication has been made to me by a gentleman on whose accuracy I can implicitly rely.—RICHMOND.

"I have always found an English acre enough for a pair of horses to plough from the 1st of November till about the 1st of March, but after then, when the days are long, and the horses can work ten hours, there is little difficulty in ploughing an acre and a half, which is one-fifth more than a Scotch acre; much, however, depends on the nature of the soil, and also on the size of the field, as a great deal of time is lost in turning when it is small: upon the whole, on *dry land*, a pair of horses will do a Scotch acre during the year. I have consulted Mr. Walker on the subject, who agrees with me in every respect, and says he always does the quantity stated on your Grace's home-farm, at Gordon Castle.

"I may take the liberty of mentioning that the farm I now occupy in Berwickshire consists of 365 acres of arable land, and about 850 acres of rough pasture and moor, and that I have never kept more than four pair of horses, and during the last three years have drained 58 acres of bog and moss land, which is now under cultivation, and that the stones, in some instances, had to be carted about a mile. I may also mention that, when the land is properly prepared, the same number of horses will drill, dung, plough in the dung, and sow turnips on five-and-a-half English acres daily. I have often done more, but this is sufficient for horses to continue at for any length of time. The drill is made with one furrow, and the dung ploughed in with another; this plan is only lately introduced."—THOMAS BALMER.

plough, and to 20 that are pulling a bad one. I must add, that Lord Moreton's ploughman thought our own horses would work as well as his own if they were as well fed. I doubt myself whether they are so formed as to walk with ease at the same pace. There is one circumstance, however, which tends to remove what certainly may appear extravagant in this calculation, although the calculation rests upon facts which can easily be disproved if they are incorrect. It arises out of another experiment which I made, and as the results are, I believe, new, and as I think they are curious, I will venture to trouble the Society with a short statement of that experiment in conclusion.

In the beginning of these trials I had imagined that if one plough were drawn more rapidly than another, its apparent draught would be unfairly increased in consequence of its having moved a greater quantity of earth during the time of its trial; and precautions were taken accordingly: it soon appeared, however, that a slight addition of speed did not raise the numbers marked by the draught-gauge. At last, therefore, I determined to ascertain, if possible, what was the actual effect produced by increased speed on the draught of the plough. This was first tried with Clark's plough on the moory ground, described already in the account of the fourth day's trial. The Scotch horses were made to go along the 5 and the 6-inch furrows at the slowest pace to which they could be restrained, not so slow a one, however, as I have lately seen in other horses at the same work. The draught was 24 stone in the 5-inch furrow, and 22 in the 6-inch one, which I suppose was on lighter land. They were next urged to the utmost speed of their walk, more than double their former rate; but though more than a double quantity of land was of course ploughed in the same time, the draught was only raised from 24 to 25 or 26 stone in the one furrow, and from 22 to 23 in the other. The extreme slightness of this increase would have surprised me still more, had I not learnt in the course of these trials how large a portion of the draught of the plough is occasioned by its friction against the soil, how small a part by the splitting, raising, and throwing over a certain weight of earth. Thus, in the trial at Lyford, a bystander pointed out to me that while one of the ploughs was being accidentally drawn down a furrow already opened, such was the adhesion of the clay, that the gauge actually marked as high a draught at that time as turned out afterwards to be the average of the plough's work in the same field. Now, friction is, I believe, often not increased by increased rapidity of motion in the two bodies rubbing against each other. But, in the draught of the plough, we have its own weight pressing against the bottom of the furrow, and that pressure increased by the weight of the furrow-slice, the latter weight not increasing,

whatever the pace may be; we have also the plough rubbing against the earth on the land side, and the furrow-slice rubbing strongly against the mould-board; all these parts of the draught coming under the head of friction which may not be increased by increase of speed. There is indeed the earth to be raised and thrown aside, the labour of which must be increased exactly in the same proportion with the quantity to be so moved; and consequently with the speed. But there is one other part of the force to be exerted by the plough which we must not overlook, the cutting or splitting force of the share and the coulter; for this part of the draught may not only not be increased by increased speed, but may even reasonably be supposed to be diminished; since, in operations of the same nature, we see at once that if a spade or a pickaxe were to be used gently and slowly, much more force would in the end be required than with a brisk effort and a quick tap.

But whatever may be the cause, it is certain that in this first experiment the draught of the ploughs was scarcely raised by doubling the pace of the horses. I determined, therefore, to make a second trial upon different ground, and thinking that this principle might in some degree serve to account for the greater quantity of land which the Scotch horses are able to plough, I requested Mr. Morton to observe the pace of those horses when ploughing at Whitfield. He informed me that they plough at the rate of two miles and three quarters an hour, excluding stoppages, and that in drawing carts singly their walk is at the rate of three miles and a quarter.

In making the experiment I did not choose the ground, but took a team at work among others, with Hart's plough, on a clover ley. The ground certainly appeared unfavourable for speed, as it was an adhesive loam upon stone brash, in so bad a state for working that the polished mould-board was completely encrusted with earth. I measured out, however, 110 yards, or one-sixteenth part of a mile, by the side of the furrow, and observed, with a stop-watch, the time employed in passing over that space. The teams of three horses were going slowly, at a depth of 4 inches only by 9 in width, but I desired the ploughman to pass along the furrow still more slowly, at the usual rate of going upon heavy, and sometimes, I must say, even upon light land in this neighbourhood. At this pace he ploughed the 110 yards in 2 minutes and 40 seconds, being at the rate of $1\frac{1}{2}$ miles in the hour. The draught-gauge marked 23 stone.

I then desired him to return to the pace at which I had found his and the other teams working; he now ploughed the 110 yards in 2 minutes and 25 seconds, being at the improved rate of $1\frac{3}{4}$ miles in the hour. The draught-gauge still marked 23 stone, as before.

I now requested the ploughman who had been employed in all the former trials to work, as nearly as he could guess, at the pace of the Clydesdale horses. He did so, and accomplished the distance in 1 minute and 40 seconds, which is almost exactly $2\frac{3}{4}$ miles an hour; his estimate thus agreeing with Mr. Morton's statement. The draught-guage marked, I should say, 22 stone only; one stone less than before. That it did not mark more than the former draught, 23 stone, I am perfectly certain.

I lastly asked the ploughman to plough the length of 110 yards at the utmost of his horses' walk. They did it in 1 minute and 5 seconds; or at the rate of $3\frac{1}{2}$ miles in the hour. The gauge rose indeed but to 24 stone only.

The following table shows the time which would be required for ploughing an acre, with a furrow 9 nine inches wide, at the different rates of motion, exclusive of stoppages.

Rate of going per hour.	Time required to plough an acre.		Draught of plough.
Miles.	Hrs.	Min.	Stone.
$1\frac{1}{2}$	7	20	23
$1\frac{3}{4}$	6	30	23
$2\frac{3}{4}$	4	0	22
$3\frac{1}{2}$	3	8	24

Here, then, it appears to me we have found the secret of the Scotch horses' superior performance as to quantity of work done. Though they are stepping briskly along at a pace which enables them to work 5 quarters of an acre in one day, while the dragging walk of other horses carries them through 3 quarters of an acre only in the same time, they feel the weight of the plough certainly not more than the others, perhaps even less. Let the horses be lively enough to face their work boldly, and step out well, they get, or rather their master gets, beyond the former 3 quarters, 2 quarters of an acre more ploughed for nothing. It is true that the horses have to walk a greater distance in one case, but this cannot be of much consequence. In ploughing an acre, with the furrow 9 inches wide, the horse has to walk in the furrow 11 miles exactly; if then he plough 3 quarters of an acre in the day, he has to walk $8\frac{1}{4}$ miles only; if 5 quarters, or 1 Scotch acre, he must pass over $13\frac{3}{4}$ miles, but $5\frac{1}{2}$ miles more than before. The increased rate of an animal's exertion has also, of course, a great effect upon the fatigue of its frame where the difference is considerable. But I suppose that each animal has in some degree a natural pace, suited to its conformation, which is most easy to it, and that the quicker rate of $2\frac{3}{4}$ miles in the hour may be as natural to the Clydesdale horse as a more tardy walk to cart-horses of our heavy breeds. Still I do not wish to assert that, under all circum-

stances, it is as easy for a horse to move quickly as slowly with a heavy draught. If he be over-weighted, he will not have sufficient strength to spare for carrying on his own weight with ease, and will naturally flag at his task. In order to move briskly, he ought, I suppose, to feel in some degree master of his work, and be able, if required, to draw something more than his actual load. I ought also to mention, after stating the superior exertions which the horse may be called on to make, that these Clydesdale horses of Lord Moreton's are not only fed in a superior manner, but that their day's work is broken into two portions of time, between which they have rest, and either return home to be fed, or are supplied by means of nose-bags with corn in the field. I believe that the practice of working horses for eight hours together not only adds to their fatigue, but that the absence of food for so long a time must be a much more severe privation to them, as to all animals feeding on grass and seeds only, than it is to carnivorous animals and to ourselves.

I will conclude by expressing the hope that others may also be induced to carry on this investigation commenced by Mr. Handley; and that, by the use of the draught-gauge on the part of agriculturists examining the ploughs they employ, and on that of manufacturers endeavouring to improve those which they make, as well as by the employment of that instrument in promoting competition among ploughwrights at our public ploughing-matches, we may gradually save that great waste of horses' strength and farmers' means which hitherto has annually taken place in many of our arable districts. Perhaps, too, when we have got a standard plough, we may employ the draught-gauge in the classification of soils, to register their different degrees of tenacity.

Pusey, November 27, 1839.

XXII.—*Results of Experiments in Subsoil-Ploughing and Potatoe-Planting.*—By the Right Hon. Sir James R. G. Graham, Bart., M.P., F.R.S.

To the Secretary of the English Agricultural Society.

Sir,

In a communication which I addressed to you in January last, I mentioned a field of 8 acres of poor and wet land, underdrained with tiles, one-half of which I had trench-ploughed to the depth of 10 inches by two ploughs following in succession; the other half of which I ploughed with Mr. Smith's subsoil-plough, following a common plough, to the depth of 15 inches.

In every other respect this field received the same manage-

ment throughout. I stated that the crop of potatoes yielded 12 tons per acre, and was nearly equal in both parts of the field; but that, in the course of winter, the part where Mr. Smith's plough had been used appeared to me to lie more dry, and to be more mellow.

In spring this field was sown with oats and grass-seeds, by the tenant, under the superintendence of my agent. The quantity of seed sown per acre, and the general treatment of the whole field, were the same. The summer has been unusually wet; yet the crop was excellent, and the grass-seeds are most promising.

One quarter of an acre was accurately measured off on that part of the field where Mr. Smith's subsoil-plough had been used: the produce was thrashed separately by hand, and yielded 13 imperial bushels; equal to 6 quarters 4 bushels to the statute acre.

Another quarter of an acre was measured off on that portion of the field where trench-ploughing had been used, and where the subsoil had been brought to the top. This quarter of an acre yielded 11 imperial bushels of oats; equal to 5 quarters 4 bushels to the statute acre.

Thus the measure of the corn produced by the land where Mr. Smith's plough was used is one-sixth more than the produce of the land which was trench-ploughed.

The oats are potatoe-oats, of superior quality, in both cases; but the weight of the imperial bushel from the subsoiled land is 3 stones, while the weight of the imperial bushel from the trenched land is 3 stones and 1 lb.: thus, the weight from the trenched land is greater per bushel, but by no means equal to countervail the deficiency of quantity.

When it is remembered that the outlay on this land was 6*l.* 18*s.* 4*d.* per acre, and that, 2 years ago, before it was drained, the rental was only 4*s.* 6*d.* per acre, it is clear that the value of this single crop not only repays the whole cost of the improvement, but is more than the fee-simple value of the land before it was improved.

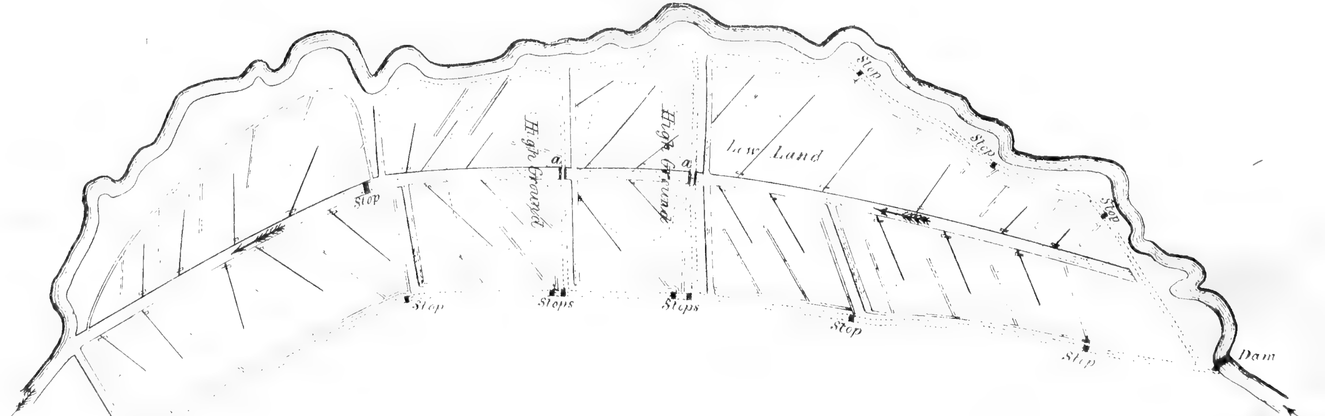
In addition to this experiment I have had another year's experience of the effects of the subsoil-plough. I am confirmed in my opinion of its excellence; and the ploughmen, who at first were prejudiced against it, and condemned it as unwieldy, because it is a heavy and troublesome implement, now readily admit its usefulness, and concur with me in preferring it to trenching.

I am quite satisfied that the use of the subsoil-plough is no less applicable to dry land than to wet: on wet land it increases and ensures the operation of the drains; but, on all land, by loosening the sub-stratum, it adds to the effective depth of the soil,

whereby the nourishment to the plant is augmented; the root takes a deeper hold; and a more genial temperature is equally maintained below the surface throughout the year. If I mistake not, it will be found that sandy loams, no less than stiff clays, profit by this system of subsoil-ploughing; and that on dry land, no less than on wet, where sterility is the consequence of a hard, hide-bound, hungry subsoil, Mr. Smith's treatment is correct, which breaks the crust without bringing it to the surface, until in time it has been mellowed by the natural effects of atmosphere and rain.

In my former letter I mentioned a field of 20 acres of dry land, half of which I had ordered to be trench-ploughed to the depth of 14 inches, the other half to be stirred with Mr. Smith's plough. This has been done; the whole field was equally manured with bone-dust, and sown with white globe-turnips. The crop, though a late one, is tolerably promising; but not yet having pulled any portion of the turnips, which still are growing, I must postpone the detailed statement of the comparative weight of the crop with reference to the different treatment of the subsoil. I may say, however, that the turnips are best on the worst part of the field, where Mr. Smith's plough was used.

I wish to avail myself of this opportunity of stating a fact regarding seed potatoes, which came under my observation on my own farm this year. I planted the potatoes in a field which had been tile-drained, but not subsoiled; and, the drains acting imperfectly in this very wet season, the land was by no means dry, and the crop of potatoes failed in one portion of the field, but not in another. I made strict inquiries to obtain an explanation of this failure, which appeared capricious; and I found that, where the stitches had failed, the seed-potatoes had been sliced, or cut into sets for planting: where the crop was good, the seed-potatoes had been planted whole. It so happened that these whole potatoes were small, and considered almost refuse, therefore not cut into sets, but planted entire: they produced an excellent crop, above an average, even on wet land in a wet season; while, in the same field, and on land of the same quality, superior seed-potatoes, cut into sets, yielded a very inferior amount of produce. My own observation is confirmed by the experience of one of my tenants, who last spring planted, in equidistant stitches in the same field, potatoes cut into three sets, at intervals of 3 inches, and whole potatoes at intervals of 20 inches. The bulk of potatoes raised from the seed which had not been cut greatly exceeded the bulk raised from the seed which had been cut; and the tenant assures me that whole potatoes may safely be planted at 2 feet apart, the interval of 20 inches not having been sufficient; whereby the difference of the quantity used for seed will



REFERENCES.

Principal Feeders marked		Brook	
Small Feeders		Stops or Sluices	
Principal Drains		Small Stops	
Small Drains		Wooden Troughs	a. a.

Standidge & C° Litho. London

be insignificant compared with the greater quantity of produce and the greater certainty of a crop.

It is not safe to draw a general inference from insulated facts; but I intend to repeat this experiment: and the great advantage of the Journal is the opportunity which it affords for fixing the attention of practical farmers on doubtful points, which require elucidation, and which, when cleared, may lead to safe conclusions of recognised importance and of universal application.

I have the honour to be,
Sir,
Your faithful servant,
J. R. G. Graham.

Netherby, Cumberland,
18*th Nov.*, 1839.

POSTSCRIPT.

Since I addressed this letter to you I had a quarter of an acre of the turnips pulled, both on the land which was subsoiled and on the land which was trench-ploughed. The turnips have been carefully weighed, and the result is as follows:—

Weight of Turnips.

	Per Quarter-Acre. Tons.	cwt.	qr.		Per Acre. Tons.	cwt.	qr.
Quarter of an Acre of White Globe Turnips on land Subsoiled . .	4	19	1	.	19	17	0
Quarter of an Acre of ditto on land Trench-ploughed	4	13	0	.	18	12	0
Difference in favour of Subsoiling over Trenching .	0	6	1	.	1	5	0

The land subsoiled is certainly inferior to the land trench-ploughed; and I consider this experiment decisive against the prudence of bringing to the surface subsoil, even of the richest quality, before it has been mellowed by the process which Mr. Smith, of Deanston, recommends.

Netherby, 11*th Jan.*, 1840.

XXIII.—*Second Report of several Operations in Thorough-Draining and Subsoil-Ploughing, at Oakley Park.*—From Mr. Richard White.—Communicated by the Hon. Robert Henry Clive, M.P.

To the Hon. Robert Henry Clive, M.P.

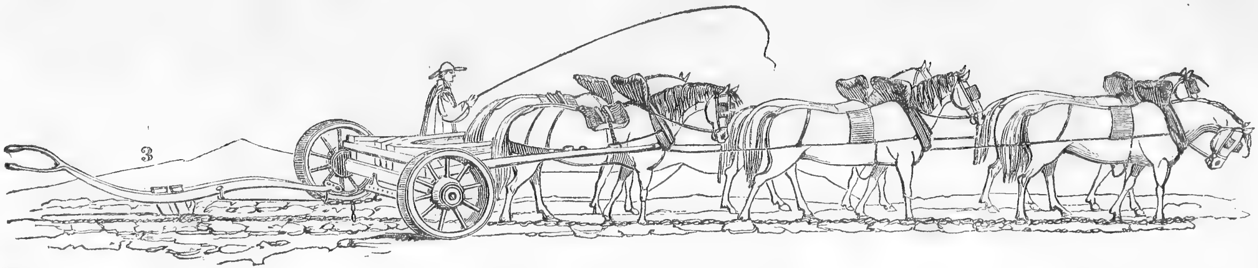
Sir,

In my report to you, in February last, upon what had been effected by thorough-draining and subsoil-ploughing upon the farm in your own occupation, and in that report I stated that I had no doubt I should be able to lay before you the future proceedings with a favourable result. I will now endeavour to give you the full particulars in as explicit a manner as I can; but, previous to going into that detail, I beg to explain why I did not give you an account of the expence attending the subsoil-ploughing; viz., that I had not then clearly ascertained what that might be, owing to the method of working it. I first commenced with swingle-trees and eight horses, from which I found great difficulty, from the leading horses causing great pressure on the backs of the foot horses. After this trial, the tumbril-wheels were resorted to, which did better, but not satisfactory, as this method caused one set of horses to walk upon the land done: it then struck me that double shafts, with low wheels, would obviate all those difficulties. I have now adopted this method, and I am more fully enabled to give you a statement of the expence, which I will attach to the abstract of last year; from which I think it will enable you to judge the part or portion a landlord and tenant ought each to bear; and, as the opinions have varied so much as to the easiest and most effectual method of working it, I am induced to send you herewith a drawing, showing the manner in which the plough is worked, with a reference. Six horses are invariably used; and I now estimate the expence of the six horses at 3*s*. 6*d*. per day, each; and that 1 acre per day is done: so that, 1 guinea per acre is added to the expence of draining, getting stone, &c. The land subsoiled is not trod upon by any of the horses; and only one of the horses of the pair in the plough that precedes the subsoil-plough walks in the furrow, and one wheel goes on the land done, which I consider does no injury whatever: and this method appears to be generally approved of by those persons who have seen it work; and although I gave a description in my last report,* I think the drawing will show it more distinctly.

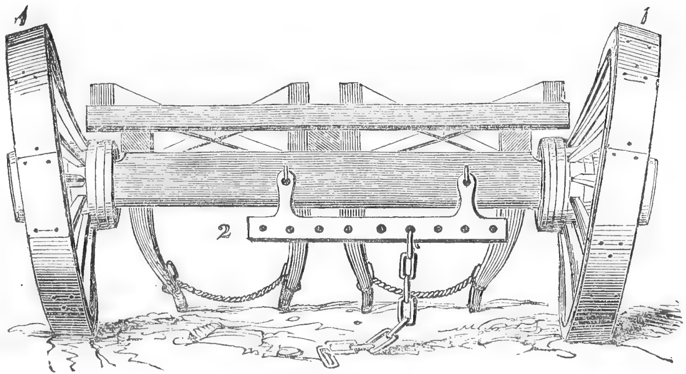
I now beg to go on with the result from last February; and, to make it quite clear, I shall introduce the abstract of that particular, and go through it by taking the separate fields, and report to you the success, also the addition of what has been drained

* Journal, Part I., page 35.

THE SUBSOIL-PLOUGH AT WORK.



THE DOUBLE-SHAFTS WITH LOW WHEELS.



1. The wheels, which are 3ft. 4in. high, and 6in. wide.
2. Iron bar, perforated with holes, for an alteration in the width of furrow, 2ft. 6in. long, 3in wide, and $\frac{3}{4}$ thick, is hung upon two hooks, screwed to axle-tree.
3. The plough, as at work, 15in. deep.

preparatory to subsoil-ploughing, together with the whole expence of the latter in addition.

ABSTRACT.

Quantities. A.	R.	P.	No.	Yards.	Amount. £.	s.	d.
10	1	29	1	8436	69	6	9
11	2	5	2	7314	47	3	0
7	0	14	3	3866	27	17	9
14	1	30	4	7133	55	1	0
5	0	0	5	3166	22	14	11
10	3	37	6	7459	66	11	4
7	1	0	7	6376	45	9	8
66	2	35		43750	334	4	5
Subsoil-ploughing 66 a. 2 r. 35 p., at 21*s.* per acre					70	1	1
Total					£404	5	6
Average expence per acre					£ 6	1	3

I shall now begin with No. 1, which was in turnips in 1838, and barley sown in the spring of this year: the land was twice ploughed; the barley sown broadcast; and the surface perfectly level; clover sown in the barley. The crop was a good deal lodged, and I am at a loss to estimate the quantity, but suppose about 26 bushels per acre, imperial measure. Although this field is a stiff clay subsoil, it is perfectly firm, and is most satistory, there being not the least defect.

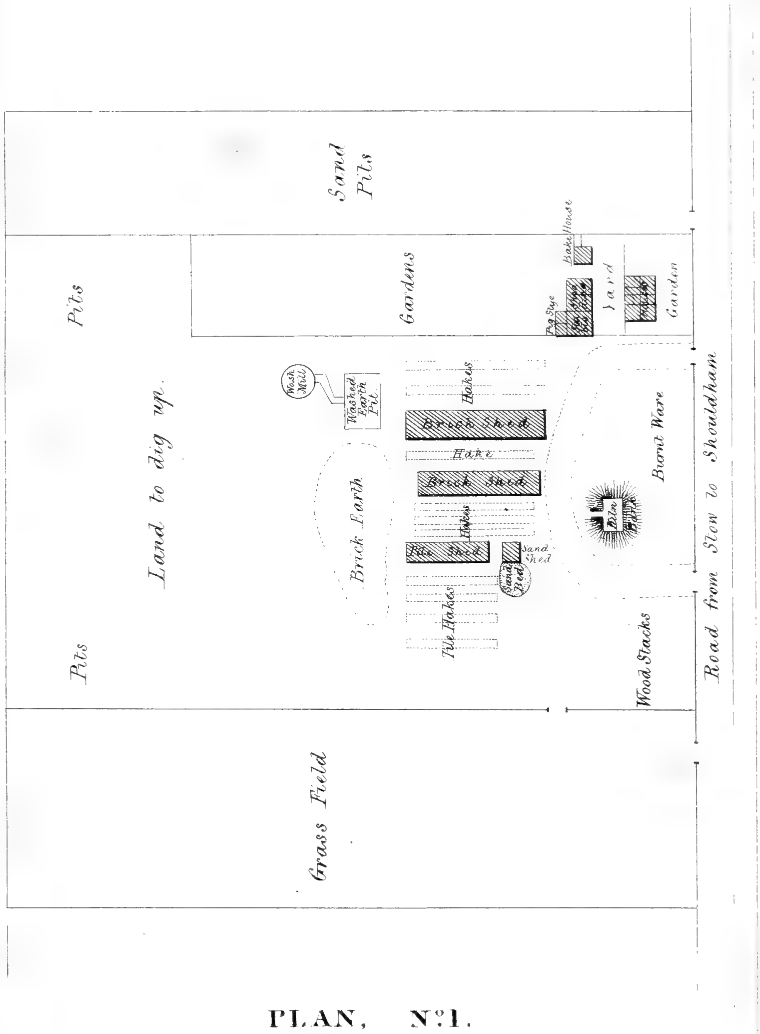
No. 2. In barley in 1838, which I estimated at 30 imperial bushels per acre; and it turned out 29 bushels of the best grain, and 2 bushels of tail. Clover and rye-grass was sown with the barley; the clover failed, but the rye-grass was a fair crop; I attribute the failure of the clover to its too soon succeeding a poor ley: the land is now sown with wheat, and is perfectly level and sound.

No. 3. Barley this year, after turnips; the crop a good deal lodged, and in consequence it is difficult to estimate the quantity; it is similar to No. 1, and I consider the yield may be about 28 imperial bushels per acre. The land was twice ploughed, and the barley sown broadcast, with clover and rye-grass, which is very promising: the land is perfectly level and firm.

No. 4. This field was worked for, and sown with, turnips. Lime was applied liberally (about 180 bushels per acre), and a tolerable manuring in the drills. The turnips came up well; and, after the first hoeing, the wire-worm and black grub made sad havoc amongst them; so much so that, out of 14 acres, I think

FODDESTONE BRICK YARD,

Stow Hall Estate.



PLAN, No. 1.

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there are not more than 5 acres, if put all together; those are good. The land is perfectly sound.

No. 5 is part of a field. Wheat (after fallow) this year: this part of the field is a stiff clay subsoil; previous to the draining and subsoiling the produce was very little. This year the wheat was an even good crop, upon a flat surface, and may be estimated at about 20 imperial bushels per acre: the difference in crop, compared with the other part of the field, was perfectly visible, and was noticed by several. The field was all limed alike, but no manure: it was previously in an impoverished, foul state. It is now intended for turnips next year. The land is now firm, and quite free from any defect or failure.

No. 6. Wheat this year, after fallow: well limed. The crop was much lodged and mildewed, and I am quite at a loss to estimate the quantity; it was much spoiled before cut, and the sample will be bad. This field was in an impoverished state. It is intended for turnips next year. The subsoil is a clay loam; and the draining is all quite perfect.

	A. R. P.		£.	s.	d.
No. 7..	7 1 0..	6376 yards: the soil is chiefly a clay loam; the drains 16 feet apart.—For cutting open, breaking and laying the stone, filling the drains, &c., at 1*d*. per yard	26	11	4
		Rising 340 loads of stone at the quarry, at 6*d*. per load	8	10	0
		Six horses carrying the above from the adjoining field, 10 days, at 18*s*. per day .	9	0	0
		Filling stone into carts, at $1\frac{1}{2}d$. per load .	1	8	4
		Total expence . . £	45	9	8
		Per acre . £	6	10	0

Two years' old ley; drained in April, and sown with oats: now ready for the subsoil-plough, when the weather will permit. This piece is all that is made ready for the subsoil-plough this season. I stated to you that 17 acres was preparing for the subsoil-plough, but only part of another field is drained, and will come in course the following year.

Two fields of old meadow-land, containing about 10 acres, has been drained, and part manured, from which the increased produce and quality is great. A considerable preparation of compost, prepared, (upwards of 400 yards,) will be ready to apply to

the permanent grass the ensuing spring; and about 15 acres is irrigated, with a very good effect.

Although the summer and autumn has been unusually wet, I am glad to say that there is not the least defect in any part of the drained and subsoiled land; and I am well assured, if the field No. 2 had not been drained and subsoiled, it could not have been sown with wheat the present season: it is now perfectly flat and sound. I also beg to remark that, in carrying the barley of Nos. 1 to 3, the waggons and horses made very little impression upon the surface.

As it is my intention to lay before you annually the progressive improvement not only of the subsoil-plough and draining, but also a general outline of the management of the farm, with the result of such system or application of manure-compost, &c. &c., as may be applied—and as the farm was in an impoverished, foul state when you took it into your own hands—I cannot, at present, give you the course that may be best to adopt; but I hope to have it in my power to say something hereafter on that subject, together with the course of crops from the commencement.

I have the honour to be, Sir,

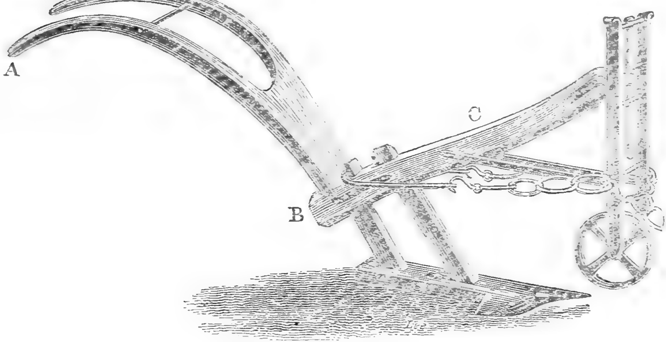
Your faithful and obedient humble servant,

RICHARD WHITE.

Prior's Halton, November, 1839.

XXIV.—*Account of the Operation of the Rackheath Subsoil-Plough, and also of the Sub-turf Plough, and the Pig's-head Potatoe Plough and Iron Hands.* By Sir Edward Stracey, Bart., F.R S.

The Rackheath Plough: invented by Sir Edward Stracey.



From A to B 6 feet.

N.B.—Particular care must be taken that the beam-ringle be of such sufficient length that the under part of the beam (C) does not rest upon the beam-ringle in any part; otherwise a fulcrum will be afforded between the wheel and the draught, which will cause the plough to rise at the heel.

To the Secretary of the English Agricultural Society.

Sir,

Having ever been unwilling to obtrude my sentiments or any invention of mine upon the public, I should never have addressed this letter to you had I not been informed by you, as Secretary to the English Agricultural Society, that in consequence of my subsoil-plough having excited some interest at the meeting of the Society at Oxford, it was the wish of the Committee of that society that I should give them some account of the operations of the plough. With that wish I comply, as were I to act otherwise I should feel wanting in respect to those individuals who have honoured me with their wish, and at the same time hoping that the agricultural interest may experience as much benefit from the use of the plough as I have for the last six years; and it will afford me the highest gratification if my humble endeavours can in any way improve the science of agriculture, as I cannot but feel that much, very much, is wanted. How many sciences are required? Mechanics, chemistry, geology, botany, entomology, &c. Perhaps no science requires a general acquaintance with more sciences than that of farming. But I must not suffer myself, by entering into a discussion on

so extensive a topic, to be led away from my present subject, "The Plough." Well, on my coming to reside on my estate at Rackheath, about six years since, I found 500 acres of heath-land, composing two farms, (which had been enclosed under an Act of Parliament about 40 years,) without tenants; the gorse, heather, and fern shooting up in all parts. In short, the land was in such a condition that the crops returned not the seed sown. The soil was a loose loamy soil, and had been broken up by the plough to a depth not exceeding *four inches,* beneath which was a sub-stratum (provincially called an iron pan), so hard that with difficulty could a pick-axe be made to enter in many places, and my bailiff, who had looked after the lands for 35 years, told me that the lands were not worth cultivation—that all the neighbouring farmers said the same thing—and that there was but one thing to be done, viz., to plant with fir and forest-trees; but to this I paid but little attention, as I had the year preceding allotted some parcels of ground taken out of the adjoining lands to some cottagers; to each cottage about one-third of an acre. The crops on all these allotments looked fine, healthy, and good, producing excellent wheat, carrots, peas, cabbages, potatoes, and other vegetables in abundance. The question then was, how was this done? On the outside of the cottage allotments all was barren. It could not be by the manure that had been laid on, for the cottages had none but that which they had scraped from the roads. The magic of all this I could ascribe to nothing else but the spade; they had broken up the land 18 inches deep. As to digging up 500 acres with the spade to the depth of 18 inches, at an expense of 6*l.* an acre, I would not attempt it. I accordingly considered that a plough might be constructed so as to loosen the soil to the depth of 18 inches, keeping the best soil to the depth of 4 inches, and near the surface, thus admitting air and moisture to the roots of the plants, and enabling them to extend their spongioles in search of food—for air, moisture, and extent of pasture are as necessary to the thriving and increase of vegetables as of animals. In this attempt I succeeded, as the result will show. I have now broken up all these 500 acres 18 inches deep; the process was by sending a common plough, drawn by two horses, to precede, which turned over the ground to the depth of 4 inches: my subsoil-plough immediately followed in the furrow made, drawn by four horses, stirring and breaking the soil 12 or 14 inches deeper, but not turning it over. Sometimes the iron pan was so hard that the horses were set fast, and it became necessary to use the pick-axe to release them before they could proceed. After the first year the land produced double the former crops, many of the carrots being 16 inches in length, and of a proportionate thickness. This

amendment could have arisen solely from the deep ploughing. Manure I had scarcely any, the land not producing then stover sufficient to keep any stock worth mentioning, and it was not possible to procure sufficient quantity from the town. The plough tore up by the roots all the old gorse, heather, and fern, so that the land lost all the distinctive character of heath land the first year after the deep ploughing, which it had retained, notwithstanding the ploughing with the common ploughs, for 35 years. Immediately after this subsoil-ploughing the crop of wheat was strong and long in the straw, and the grain close-bosomed and heavy, weighing full 64 lbs. to the bushel. The quantity, as might be expected, not large (about 26 bushels to the acre), but great in comparison to what it produced before. The millers were desirous of purchasing it, and could scarcely believe it was grown upon the heath land, as in former years my bailiff could with difficulty get a miller to look at his sample. Let this be borne in mind, that this land then had had no manure for years, was run out, and could only have been meliorated by the admission of air and moisture, by the deep ploughing. This year the wheat on this land has looked most promising; the ears large and heavy, the straw long; and I expect the produce will be from 34 to 36 bushels an acre: the wheat, the "golden drop." My Swedish turnips on this land this year are very good; my pudding and sugar-loaf turnips failing in many parts, sharing the fate of those of my neighbours, having been greatly injured by the torrents of rain which fell after they had shown themselves above the ground. Turnips must have a deep and well-pulverised soil, in order to enable them to swell, and the tap-roots to penetrate in search of food. The tap-root of a Swedish turnip has been known to penetrate 39 inches into the ground. I will not detain my readers much longer, and will only add two or three general observations.

1st. The work done by the plough far exceeds trenching with the spade, as the plough only breaks and loosens the land all around without turning the subsoil to the top, which in some cases (where the subsoil is bad) would be injurious to the early and tender plant; and if the subsoil is good, it would be rendered more fit for vegetation after the air and moisture had been permitted to enter. The ploughing is also far preferable to trenching by the spade even for planting, as it may be done at one-fourth the expence.

2ndly. It were very preferable, if possible, to work the horses abreast, pair and pair; but, in using this plough, the horses *must* work in a line, for if abreast, the horse on the land ploughed would soon be fatigued by sinking up to his hocks: and, to render the draught more easy, the second horse from the plough should

not be fastened to the chains of the horse next the plough; but the chains of that second horse should be made long enough to be hooked about 2 feet behind the back-band of the chains of the horse next the plough, so that the second horse will draw at an angle of about 33 degrees; otherwise, were the chains of the second horse hooked in front of the back chain, he would pull the whole weight of his draught, together with that of the horses preceding him, on the back of the horse next the plough; and the strength of that horse would be lost in the draught, as his whole powers would be exerted in his endeavours to prevent being brought down upon his knees. By so arranging the chains, the power of 3 horses would be equal to that of 4.

Now, being on the subject of the subsoil-plough, I may as well tell you I have contrived another plough, from the use of which the greatest benefit has been derived by my park land. I call this my "sub-turf plough." It is used to loosen the turf about $10\frac{1}{2}$ inches deep below the surface, without turning over the flag; loosening the soil underneath—consequently, admitting the air and the rain—and permitting the roots of the herbage to spread in search of food. There are no marks left by which it can be known that the land has been so ploughed, except from the straight lines of the coulter, the lines at the distance of about 14 inches one from another. In about 3 months from the time of ploughing, these lines are totally obliterated, and the quantity of aftermarth, and the thickness of the bottom, have been the subject of admiration of all my neighbours. Another advantage from this sub-turf ploughing is, that before that took place water was lying stagnant in many parts (after heavy rains), especially in the lower grounds, to a great depth: now, no water is to be seen lying on any part, the whole being absorbed by the earth.*

In consequence of the great expence of digging up potatoes (viz., about 30*s.* an acre), I have made another plough, to turn them out of the ground, which I call the pigs'-head plough; the head of that animal suggesting the idea to me on observing how easily he turned the potatoes out of the ground. It has answered most satisfactorily. The plough works about 10 inches deep, and more if required, throwing up the potatoes on each side, partly covered with loose mould; to remove which, I have iron hands, made like the human hand, for the women to remove the mould with one hand, and with the other to collect the potatoes. A woman is placed on each side of the furrow, with a basket in the middle. A plough will employ 4 pair of women, placed at

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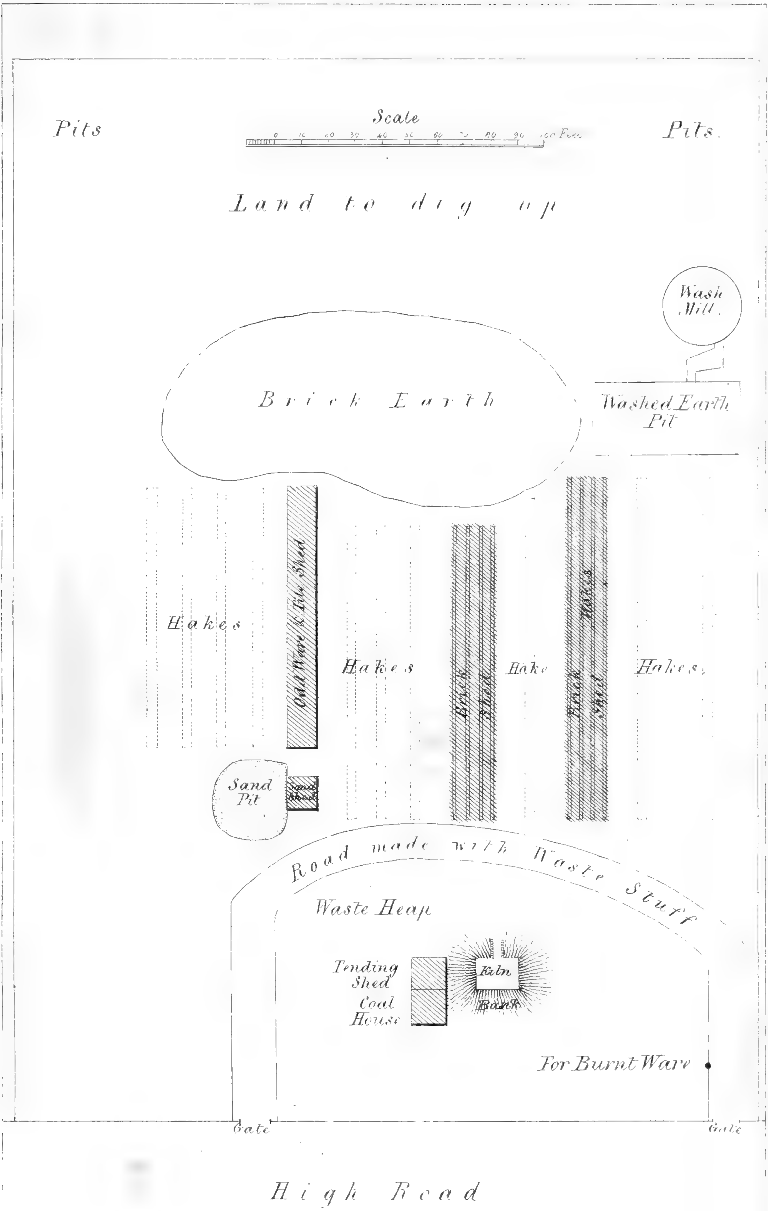
* In an experiment I have made with the Rackheath-plough, the absolute necessity of previously under-draining the land wherever the subsoil is retentive of moisture is clearly shown.—W. L. RHAM. *See page* 259.



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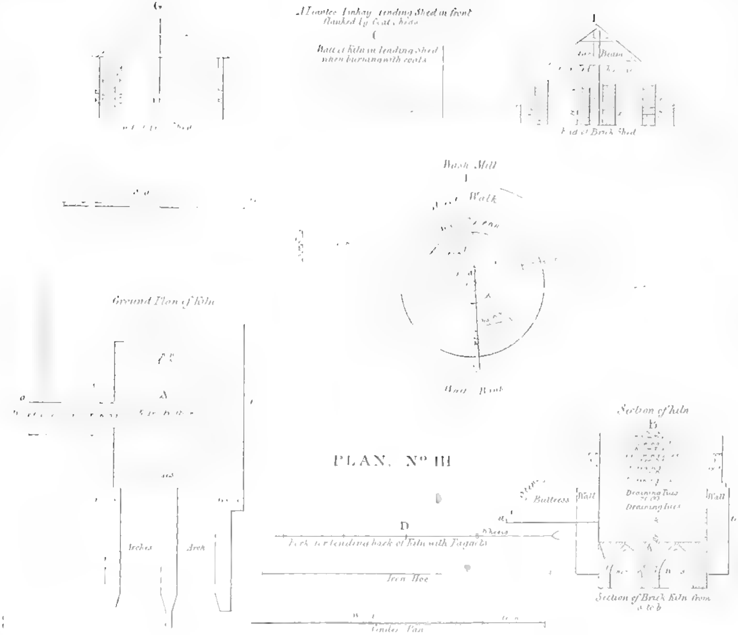
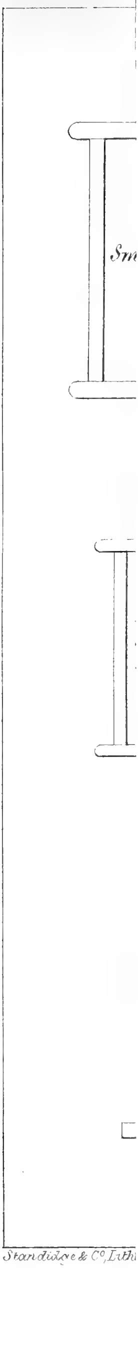


G
C
Back of Kiln in tending shed
when burning with coals
I
Beam
End of Brick Shed
Wash Mill
Walk
Ground Plan of Kiln
A
Section of Kiln
B
Buttress
Wall
Drawing Tiles
Drawing Tiles
Wall
D
Fork for tending back of Kiln with Faggots
Iron Hoe
Cinder Pan
Section of Brick Kiln from
a to b

PLAN, Nº III



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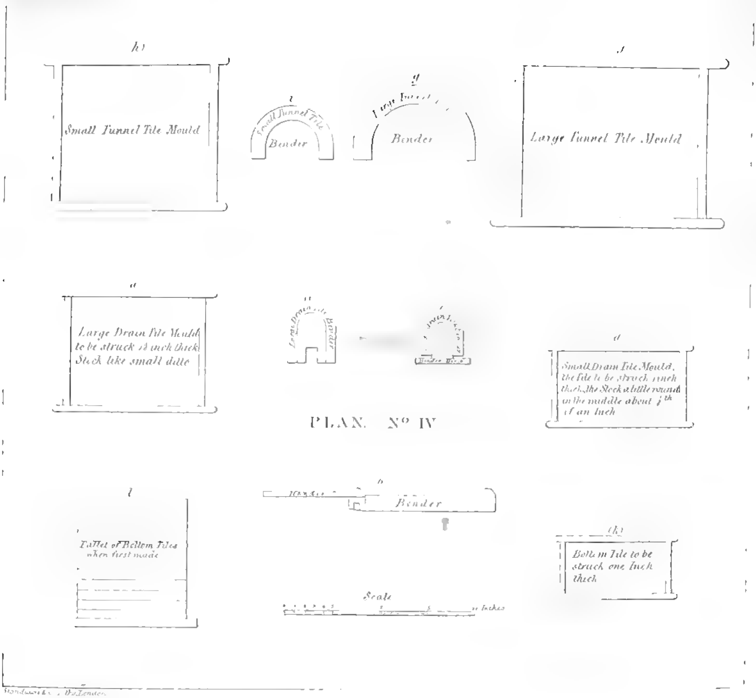
h)
Small Tunnel Tile Mould
i
Small Tunnel Tile
Bender
g
Large Tunnel
Bender
f
Large Tunnel Tile Mould
a
Large Drain Tile Mould
Stock like small ditto
Bender
d
Small Drain Tile Mould,
of an Inch
l
Tablet of Bottom Tiles
when first made
b
Bender
(k)
Bottom Tile to be
struck one Inch
thick
Scale
PLAN. No IV

different parts, to collect and to put the potatoes into the baskets (placing a basket between each pair), and two men to take away the baskets when filled, and empty them into a cart ready to receive them.

Any person is most welcome to have a model of any instrument of mine which they may deem worthy of their attention.

I am, Sir,
Yours, &c. &c.
Edward Stracey.

Rackheath Hall, near Norwich,
September, 1839.

XXV.—*Experiments on the Improvement of Poor Lands by Subsoil-Ploughing, both with and without Underdraining.*—By The Rev. W. L. Rham, M.A., Vicar of Winkfield.

To the Secretary of the English Agricultural Society.

Sir,

As it is of more importance to the progress of agriculture to have well-authenticated facts, and accurate details of different modes of cultivation, than mere theoretical speculations, I venture to lay before the English Agricultural Society the result of two Experiments, made with considerable attention to every circumstance which might influence the result.

I. The first which I shall mention may be found interesting at this moment in consequence of its throwing some light on the use of the subsoil-plough, which, although by no means a new invention, has lately been strongly recommended on particular soils, not without some discussions as to its merits, and doubts of its general usefulness.

The field which was the subject of the experiment was once a portion of the open common in the forest of Windsor, and brought into cultivation soon after the inclosure of the forest in 1813. Its soil consisted of a very moderate loam, inclined to yellow clay, only a few inches in depth; the subsoil chiefly a stiff clay, but with occasional portions of a very gravelly loam, nearly impervious to water. The surface is slightly undulated, and sufficiently inclined to let off the surface-water by means of open drains. It was first brought into cultivation by paring and burning the surface; and no very regular rotation of crops was followed. The first crop was turnips, broadcast; a very good crop, in consequence of the ashes. After this had been fed off by sheep, came oats; a good crop. It was then chalked, at the rate of about 15 tumbrel-loads to the acre, and manured with good dung, 6

tumbrels per acre. After this, part of the field was planted with potatoes, part with beans, and part with peas, as experiments; the crops were moderate. The next crops were half wheat and half oats; fair crops, about $3\frac{1}{2}$ quarters of wheat and between 5 and 6 quarters of oats per acre. A similar course was pursued, with variations, till within a few years, when rye-grass and clover were sown with the last crop. The grasses were mown twice for hay the next year. The two next years the field was pastured, chiefly with sheep.

This I consider to have completed the preparatory cultivation; and the field, when broken up, showed a manifest improvement in the depth, colour, and texture of the soil. After that it bore beans and wheat. It was then fallowed, in order to clear it of the coarse natural grasses which, in spite of all this cultivation, had not been entirely eradicated, and also of a considerable portion of couch-grass (*Triticum repens*), which had increased in the soil. Six acres of the field were subsoil-ploughed, early in 1838, to the depth of 14 or 15 inches, by means of the Rackheath-plough, made by Messrs. Ransome and Co., at Ipswich. A common swing-plough (the only plough I ever use), with two horses abreast, first made a furrow of about 6 inches deep. Not having a large team, I had several such furrows opened, and then the two horses, and two more, who had been carting manure while the other pair was ploughing, were yoked to the Rackheath-plough, which stirred the subsoil 9 or 10 inches deep. The common plough after that filled up the furrows. Thus somewhat less than half an acre a-day was subsoil-ploughed with 4 horses, the weather being very favourable. The land was now manured with 10 cart-loads of yard-dung to the acre: one acre was planted with potatoes; in another acre, mangold-wurzel seed was drilled in rows 18 inches apart; two acres were sown with Swedish turnips, and two acres with red tankard turnips. The mangold-wurzel was either taken off early by the fly, or failed; and turnip-seed was drilled over it. The Swedes were also sown a second time. Before Christmas there was a very good appearance of Swedes and turnips; which had been properly hoed two or three times, and were clean. I congratulated myself on the result of the experiment; and began to feed off the turnips with sheep, drawing a portion for the cows at home. The winter was wet, and I was soon obliged to remove the sheep. The ground became too hollow to bear the cart-wheels and the tread of the horses; and I began to regret having loosened the subsoil, which now held wet like a sponge. I had never thought that the field required underdraining. The water always ran off by the open drains before it was subsoil-ploughed; I might, therefore, very naturally have concluded that the subsoil-plough had now ruined my land. The turnips were

not eaten off or carted home till late in spring; and perhaps I should have lost the use of them altogether, or spoiled my land by cutting it up, if I had not determined on an effectual remedy.

I immediately ordered 18,000 draining-tiles, which fortunately I procured from different kilns in the neighbourhood: they were the footed tiles. The common size cost 2 guineas a thousand, besides carriage: they were 13 inches long; those for the main drains cost 3 guineas a thousand, 6 inches in diameter, but only 12 inches long. I laid out the drains 30 feet apart; the common drains 26 inches deep, the main drains 30 inches. An immense volume of water ran out of the drains before the tiles were put in; and, in a short time after they were filled up, my sheep returned to the fold, and my cart took the daily supply of turnips for the cows. The whole field was underdrained at a cost of 50*l.*, besides the carriage of the tiles, that is only 5*l.* per acre. Of the 6 acres which had been subsoil-ploughed, 2 were drilled with Chevalier barley and 4 with Tartarian oats. Red and white clover, rye-grass, and other grass-seeds, were sown after the land had been harrowed, and the surface was rolled. The season being moist, the clover grew very rapidly, and the barley suffered in consequence. The crop, notwithstanding, was fair, reckoned at about 4½ quarters to the acre; which is more than is usually grown in the neighbourhood. Had there been no clover, 6 quarters might have been fairly expected from the length of the straw and ears. The Tartarian oats kept down the clover. The straw rose above a man's head, and the crop was very heavy. It is not threshed out, but we estimate it at 9 quarters to the acre. From the yield of a small portion threshed, I have reason to think it will exceed this. The field is now (Dec. 21st), after all the rain which has fallen in autumn, as dry and sound as any pasture I have. My cows and horses have been occasionally turned into the field without making any impression; and the old water-furrows, which were dug out by my men, from habit, are quite dry, with fine clover in the bottom of them.

The conclusion to be drawn from this experiment is important, as it shows that, wherever the subsoil is retentive of moisture, complete underdraining is essential; and that the subsoil-plough should never be used until the water can run off below. It also shows what an improvement is made on moderate land by the union of draining and subsoil-ploughing. The cost is nothing when compared to the result. The 50*l.* I laid out on this field I consider as the most profitable investment I ever made. The 4 acres which were not subsoil-ploughed are in artificial grass: as soon as the field is again broken up, which will be in two or three years, this portion shall also have the benefit of the subsoil-plough.

II. The other experiment which I would mention was made on a field of 5 acres, of a cold wet clay. When I first took this field the soil was poor and heavy. About 5 or 6 inches of soil only had ever been stirred. All the land around is in permanent grass, being supposed too heavy and wet for profitable cultivation with the plough. The tenants are tied down, under heavy penalties, not to break it up. The mode in which my field had been cultivated before, was the old one of two corn crops, after a complete fallow. To attempt to have turnips there would have been considered as absolute folly. The first thing I did was to trench-plough it very partially, only bringing up about an inch of the yellow clay: and this was too much. It was then well chalked all over; a practice extensively followed here, where there is no calcareous earth in the natural soil. The chalk is carted seven miles, and is reckoned to cost 1*l.* per waggon-load when laid on the land. From 5 to 10 waggon-loads per acre are usually put on the land every 8 or 10 years, at the time it is fallowed.

I followed the old course of tillage, with the variation of wheat, beans, oats, and tares; manuring well, and fallowing every 4 or 5 years. But every course was attended with loss, as my accounts proved, although I had fair crops, paid a very low rent (for it is not my own), and it was tithe-free. This did not suit my purpose; but, as I had a lease of it, and could not give it up, I laid it down to grass with a crop of oats, sowing clover and a mixture of good grass-seeds. The feed of it would more than cover the rent and outgoings; and I could lay out my money to better advantage on improving my own land.

It remained in grass five years, in which time it was mown twice for hay, and fed three years. After the first two years the grass began to deteriorate, and at last the coarse grasses, especially *Alopecurus arvensis,* and the different varieties of *Agrostis* prevailed, and left bare spaces between them. I therefore determined to break it up. Preparatory to this I had all the old furrows ploughed out between the ridges which still remained. The sward which the plough raised was taken up and carted into heaps at the corners of the field, which was then ploughed and left for 6 weeks. On the 1st of January, 1835, the weather being very mild, beans were dibbled on it, in rows 15 inches distant, the beans being put in 4 inches asunder. They came up well, and were very carefully hoed three times, and the weeds pulled up by hand. The crop was abundant, the bean-stalks were high and well furnished with pods through their whole length. The produce was 30 quarters of excellent horse-beans (6 quarters per acre). The bean-stubble was cleared and the land cleaned with the scarifier, harrows, and rake, and then ploughed.

Red wheat was drilled upon it immediately, and produced next autumn 25 quarters of plump corn. I need not add that the wheat was hoed and weeded about the time it began to tiller. The wheat-stubble was ploughed soon after harvest, after a moderate coat of compost had been applied, and the field was sown with winter tares. This compost was made by mixing farm-yard dung with the earth which had been ploughed out of the furrows on breaking up the grass, and which had been turned over twice with the spade, so that it had the appearance of fine garden-mould. Great attention was paid to have water-furrows sufficient to carry off all superfluous water. The tares produced a good crop in 1837, which was partly made into hay; a small portion was cut up green for the horses; and a part, left for seed, was reaped in the end of August. Where the tares had been left for seed some manure was applied. The field, being again ploughed, was sown with wheat, and produced 20 quarters (4 quarters per acre). It was now apparent that the weeds were increasing, and that a cleaning became necessary: the wheat-stubble was therefore scarified, and the surface raked; the weeds were burnt, or carried off. The whole was ploughed as deep as possible before Christmas, and left rough to the influence of the frost. This was in 1838. As soon as the business of the farm permitted in the spring of 1839 the field was ploughed level by reversing the furrows; the heavy harrow, called here the drag, was drawn over in all directions, and all the roots and weeds were collected. It was next ploughed at right angles to the first direction, and after a little time harrowed repeatedly, and all root-weeds carefully forked out. In April, after spreading about 18 cubic yards of fresh stable-dung on $1\frac{1}{2}$ acre, potatoes were put, 12 inches apart, into every third furrow, after the plough, the manure being raked over the sets, and covered by the returning plough. On the remainder of the field, the rest of the manure, consisting of about 40 cart-loads of good yard-dung, which had been carted on to the headland from the yard, and there turned over once, was spread evenly. It was now ploughed into very small ridges, 32 inches wide, each consisting of 2 furrows up and 2 down, or 2 *bouts*, as they are called. On the top of these ridges, after a light harrow had gone over, one row of Swedish turnips, or of the red globe-turnips, was drilled. Plenty of seed was used to secure a plant. After this, the turnips, which came up well, were cultivated after the Northumberland manner; the intervals were ploughed, first laying the earth from the turnips, and then to them again. The double mould-board plough, which reached down to the yellow clay, deepened the middle furrows, and gave a free course to the water.

The Swedes and red rounds are as good a crop as I could desire.

The distance of the ridges will allow the wheels of my carts to take 2 ridges between them, the horse walking in the interval between them. Thus I shall draw the turnips without injury to the land, even in wet weather; but I mean to avail myself of a few dry days to take them off and set them in a sheltered situation, as close as possible, with the tops on, where they will continue to vegetate slowly, and no frost will injure them, as I know by experience.—

This minute detail of my operations may appear tedious, but it tends to establish an important fact, that cold wet clays may be improved so as to bear good crops of turnips, even without underdraining. I do not pretend to say that underdraining would not greatly improve this field; but it has not suited my purpose or convenience to do so hitherto, and I have made it profitable without draining. I would not on any account use the subsoil-plough here, unless I first drained it thoroughly.

The subsoil-plough does wonders in lands which have a porous subsoil, even when employed *by itself;* but, unless its application on stiff wet lands be accompanied *with draining,* it makes them worse, keeping in the water which would otherwise run off the surface.

W. L. Rham.

Winkfield, Berkshire, November 1, 1839.

XXVI.—*On French Agriculture and State Establishments.* By John Evelyn Denison, Esq.

A spirit of agricultural improvement is showing itself in France. At a moment when this subject is attracting so large a share of public attention in this country, it may be a matter of interest to some persons to know what is the present condition of agriculture among our neighbours in France, and what are the means in operation towards its advancement.

That the two countries differ most widely in all that relates to agriculture—that, seeking the same end of improved cultivation, they set out almost from opposite points and employ very different means,—would increase rather than diminish the interest of this inquiry.

In England the land is in great measure owned by large proprietors, and cultivated by tenants possessed of capital and skill:—

In France the land is almost infinitely subdivided among small proprietors.

In England the individual enterprise of landlords and tenants detects deficiencies, and supplies the remedy:—

In France, from the want of capitalists, the government is

obliged to take the part of instigator and chief agent in the career of improvement.

In comparison with the English system of enclosures, France may be called one vast open field. You may travel from Calais to Paris, from Paris to the German frontier, to the Alps, to the Pyrenees, and scarcely see a hedge or a partition-fence of any sort. This vast open field (unlike the open districts of England, where the operations of farming are generally conducted on the largest scale) is cut up into the smallest conceivable plots of every variety of produce. As far as the eye can reach, over vast plains bounded by sloping hills, you see the surface varied by every description of crop; none perhaps above an acre or two in size, the larger portion not more than the fourth or the eighth of an acre. Here a vineyard 100 yards by 20, there a strip of wheat, lucerne, barley, oats, potatoes, clover, vetches. Few roads intersect this extensive garden, which from the nature of the cultivation must be traversed every day in all directions by the proprietors and cultivators of the various lots. The owner of a plot of lucerne, half a mile from the high road, must pass one neighbour's vineyard, another's wheat, and fifty such varieties, to reach his own plot, where he must cut his lucerne, make it into hay, and carry it home, either on his own back, or piled on an ass or horse, along the narrow paths which intersect the plots. The residences of these proprietors are almost invariably congregated into villages or towns, and lie therefore, for the most part, quite wide of their respective allotments.

Upon English principles of farming and of rural economy it is difficult to imagine how such a system of cultivation can be carried on successfully and profitably for a series of years. How is manure to be made? how are cattle, the great agents in reproduction, to be kept, and restoration to be made to the land? It is clear that over this vast open field, thus laid out, no cattle can depasture, and, though a certain amount of stock may be kept in stables, the amount must be limited from the want of winter food, as few or no turnips are seen, and the transport of manure to the distant plots from the want of roads and tracks must be operose and expensive.

Such is the condition of a large portion of the surface of France. There are extensive tracts of forest, of pasture, of vineyard, and in some parts of corn lands, which have not been subjected to this process of division, but the desire to possess an interest in the land, however small, is a ruling passion among the population of France, and the principle of division is proceeding in its unchecked career. What results will follow from this hitherto unproved experiment occupies, as may be well supposed, no small share of public attention in France. The comparative advantages of large and small properties have been discussed under all their aspects,

and speculated upon as to all their consequences, agricultural, social, and political. There is no doubt that in several articles of produce, and especially in that of wine, the increase has been considerable under the new order of things. But again, no culture makes so small a return in manure as wine, and it does not appear that, with increased quantity, there has been an improvement in quality, and in no product is quality so important as in that of wine.* Mons. Chaptal, in his able work on the "Application of Chemistry to Agriculture," enters at length on the subject of large and small properties; and in deciding in favour of the subdivision of lands, after enumerating many of its favourable features, thus escapes from the difficulties of the question:—

"After all," he says, "we do not see the principle of subdivision prevail in those districts peculiarly suited to the larger culture, the vast domains of La Bauce, of La Brie, of Soissormais, of Haut Languedoc, remain without division, and are still the granaries of France. The rich pastures of Normandy, of Poitou, of Anjou, feed the same number of cattle, our large forests continue in their integrity, the population and the means of subsistence are both considerably increased, our markets are abundantly supplied. Ease is on every side extended over our fields, industry makes rapid progress, the public imposts are readily and regularly paid. Let us take care how we disturb, by laws affecting property, this general harmony, and this public well-being, which assure the happiness and prosperity of our country." †

This inquiry in all its branches is full of interest, but to pursue it would lead us into too wide a field, and into the discussion of topics in some respects beside the purposes of this publication. We must confine ourselves on the present occasion to the agricultural considerations alone.

In this state of divided means throughout the country the government steps in, and, partly by establishments maintained entirely at its own cost, partly by aiding local institutions with its patronage and funds, leads the way in the path of improvement.

The establishments maintained entirely by the government are—

1. Sheep Farms	3. Veterinary Schools
2. Model Farms	4. Haras or Studs.

The institutions aided by government funds and patronage are—

1. Public Lectures	3. Local Associations
2. Agricultural Societies	4. Departmental Model Farms.

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* The quality can rarely be improved by manure. Not many years since a celebrated growth of Burgundy was greatly injured by a profuse application of dung to the land. The vintage was abundant, but the wine fell so materially in price, as to occasion a heavy loss to the proprietors, until the soil recovered its natural state.—F. Burke.

† May not all this be attributed in some degree to the prevalent system of spade-culture?—F. Burke.

Sheep Farms.—The sheep farms are three in number, at Rambouillet, Perpignan, La Hayevaux. They are devoted to rearing the best breeds of sheep, and of trying experiments in crosses. The breeds chiefly attended to are the Merino, the Naz, a race with fine wool, but of very small frames, and the English long-wool sheep.

There is an annual sale of the produce, of the wool, and of rams, &c. At these sales the results are exposed to the public, who may judge for themselves, and turn them to the best account in their power, under open competition. These sales nearly cover the expences of management, and it is expected that soon they will quite do so. At Rambouillet the sale this year of 41 picked rams, and 49 ewes of the Merino breed, produced 1117*l.*, above 12*l.* a-piece. Some rams fetched 60*l.* Of the Naz Rambouillet breed 10 rams sold for 14*l.* each. The object sought in the Naz Rambouillet cross is to ascertain to what point increased weight of carcase and of fleece can be carried, without sacrificing the fineness of the wool.

The English flock consists of 320 head, and it is proposed to fix them somewhere near Calais or in Normandy, that they may have the advantage of a climate as nearly resembling their own as possible. Of this flock 29 rams fetched 5*l.* 16*s.* each, 20 ewes 4*l.* each. Rambouillet has 715 head of sheep, Perpignan 504, La Hayevaux 312.

Model Farms.—Of the model farms maintained entirely at the government charge, Grignon is the chief. It was founded in 1829, and consists of 1100 acres of land of different qualities, arable, pasture, meadow, water meadow, wood. Here the best implements, collected from England and Germany, are put to trial, the best systems followed under the guidance of an able professor, and theory and practice go hand in hand.

The pupils are divided under the heads of "internal" and "external;" the first board and lodge within the walls of the establishment, the second find lodgings for themselves and attend only the courses of instruction. The charges for the first vary from 60*l.* to 30*l.* a-year; for the second, from 20*l.* to 8*l.* The shortest course occupies two years, after which time, on passing a public examination, a pupil may receive his diploma, taking rank as a sort of Master of Arts of Grignon.

Veterinary Schools.—There are three chief veterinary schools, at Alfort, near Paris, Toulouse, Lyons. The course of education lasts four years. Botany and chemistry, as well as anatomy, are taught, and strict examinations take place before the students can receive their diplomas. Besides the horses used for examination and dissection in the schools, invalid horses are taken in at a moderate rate, and treated in the hospital, so that a large field of

practice is opened to the students. At Alfort there are 280 scholars. These youths are lodged, boarded, washed, and instructed for 14*l.* a-year. Out of the number the government provides appointments for about 40 in the cavalry and in other departments. There is a considerable space of ground attached to the establishment, and a botanical garden. As it is intended that the youths educated here should be instructed in all points of useful practice relating to agriculture, that in after-life they may be of more general use in the farming districts, an establishment of sheep, pigs, and dogs is kept up, in order to illustrate the diseases and treatment of these animals. In order to let the country people know who have obtained diplomas in the veterinary schools, the prefets have orders to fix up a list of their names in each commune.

Here, too, a part of the herd of short-horn Durham cattle, bought of late years by the government, has been brought, for the edification of the Parisians, as specimens of the improved breed. They have 2 bulls and 8 or 10 cows of this breed at Alfort, kept always in the stable, looking well, and well attended to.

It is proposed to establish a breeding-herd of short-horns at Du Pin in Normandy, in connection with the great breeding-stud for horses now flourishing there. The favourite colour in France is red, and that colour is preferred perfect, not broken into roan, as with us.

At present, though the Government circular of 1838 especially invited public attention to this improved breed of cattle, a taste for it does not appear to have made great progress in France.

Haras, or Studs.—The haras or studs are by far the largest and most expensive of the government establishments connected with rural affairs: of these haras, three are breeding establishments, where mares and foals are kept—Du Pin, Rozieres, Pompadour. The principal haras is that of Du Pin in Normandy, where some of the best horses are bred from pure English blood. At Rozieres the chief attention is directed to a mixed breed, that has been long established in that neighbourhood, called the "race ducale," from the Dukes de Deux Ponts, the former possessors. At Pompadour the breed is almost exclusively Arab and Persian; they have 40 Arab mares, and a great many Arab horses.

These establishments altogether contain no less than 1300 horses. Of thorough-bred stock they have 167 stallions, 98 mares, 121 colts and fillies.

The covering stallions for the departments amount to 870, who cover on an average 35 mares each, making 30,450 mares covered yearly by government stallions, These stallions do not travel, but are kept at their respective stations.

In the last Report presented to the Chamber, the result of the home breed is pronounced to be quite satisfactory. They have come out at the public races, and have proved their good qualities by public running. The Report predicts that they shall soon be independent of English supply, except for an occasional cross of the best and most esteemed blood.

A French stud-book has been published, with a complete list of all the thorough-bred horses imported, or bred in France. The Government intends to collect the necessary documents to continue its publication.

The breed of carriage-horses is improving in Normandy, where trotting matches have been instituted.

Besides these large establishments, individual enterprise is encouraged by the offer of prizes to any one who proposes to travel a stallion which shall be approved of by the authorities. The prizes are, for a riding-horse, from 12*l.* to 24*l.*; a carriage-horse, 8*l.* to 20*l.*; a cart-horse, 4*l.* to 8*l.*: for thorough-bred brood mares, Arab, Barb, Turkish, Persian, or English, from 8*l.* to 16*l.*: for a country mare, covered by a thorough-bred horse, from 8*l.* to 12*l.*

These high premiums, it appears, have led to some abuses. The possessors of the prize mares, instead of preserving them for breeding, in fulfilment of the intention of the Government, finding an increased facility in their sale from the prizes they have gained, have sold them out of the districts. To prevent this, the premium is now spread over a term of three years, half is paid in the two first years, and half in the third year.

The difficulty of conducting these large establishments from one centre point of management must be great, requiring machinery of proportionate power and compass. The correspondence is voluminous, and the returns infinite. Nothing would better illustrate this than a glance at the rules and orders of the haras. The royal ordonnance for the "organization and regulation of the haras" fills a quarto volume of 52 pages. The duties of inspectors-general, of directors, of local inspectors, of special agents, of surveyors, of veterinary surgeons, of breakers, of jockeys, of working grooms, are set forth with full particulars; the dress of each is prescribed through every article of his wardrobe, from the military hat with a black plume of the inspector-general, the blue stable jacket, cut à l'Anglaise, of the groom, his pantaloons garnis de demi-bottes simulées en cuir, down to his leather straps, and his two black hair stocks.

Everything relating to the horses is fixed with equal precision. Their stations at head-quarters, their posts during the season, their allowance of forage, when stationary, and when moving,

varying not only with the months of the year, but in the different districts of the country.

To take, for instance, the 3 first on the list of the 23 stations enumerated: *—

	Ordinary Allowance.					Allowance during the Season.				
	Oats.	Hay.		Straw.		Oats.	Hay.		Straw.	
	Pints.	lbs.	oz.	lbs.	oz.	Pints.	lbs.	oz.	lbs.	oz.
Abbeville . .	16	6	11	17	10	21	6	11	17	10
Angers . . .	14	11	0	13	4	17½	11	0	13	4
Aurillac . . .	14	11	0	15	7	16	11	0	15	7

Each article of horse furniture is prescribed. To every horse a rug, surcingle, and pad, and all necessary tackle for exercise, a complete English saddle, two bridles, a stable bag, with the necessary utensils for grooming, brush, currycomb, sponge, rubber, pair of scissors, picker, scraper, comb. The heads of the establishment are to examine every eight days whether all these articles are in their places, and to report to their superiors in written formulas.

It is unnecessary to say that the system of accounts provides every conceivable check and safeguard.

But these minute regulations are not confined to the departments alone, but extend to individuals with whom they come in contact. Rule 48 provides that every individual who shall have brought a mare to the royal stud must acquaint the chief of the station, where the mare shall have been covered, with the sex of the produce. He must, moreover, sign a declaration on the card which shall be delivered to him at the station, setting forth the birth, with a description of the colour of the foal. This declaration, signed by him, must be attested by the mayor of the commune, who shall transmit it, through the medium of the préfet, or sous-préfet, to the director of the haras, who, after the verifica-

* The following are the original French measures and weights, from which the above English values have been obtained:—

	Ordinary Allowance.			Allowance during the Season.		
	Oats.	Hay.	Straw.	Oats.	Hay.	Straw.
	Lit.	Kilo.	Kilo.	Lit.	Kilo.	Kilo.
Abbeville . .	9	3	8	12	3	8
Angers . . .	8	5	6	10	5	6
Aurillac . . .	8	5	7	9	5	7

tion of the card of the covering, shall address in exchange, and through the same channel, to the proprietor of the mare, a certificate bearing evidence of the facts there enumerated.

This looks like very cumbersome machinery among a rural people, for an object of small importance, and the whole operation seems to revolve in a circle, bringing back in the end a certificate to the individual proprietor, of a fact of which he, in the first instance, supplied a certificate himself.

But these infinite circles of correspondence result necessarily from the nature of establishments governed from a common centre.

The second branch of assistance afforded by government consists in disseminating information and instruction in matters relating to agriculture, and in trying, practically, experiments; by public lectures, by societies, by associations, and by departmental model farms. There are three principal courses of lectures on agriculture: and, by a regulation made in 1836, the science of agriculture, divided into three branches—cultivation, mechanics, and chemistry,—forms part of the superior instruction in the Conservatoire des Arts et Métiers.

With respect to the societies and associations, and departmental model farms, the course pursued by the government is to require annual reports through the préfets, who forward applications from those quarters where assistance is desired. The government asks, "Have you land for a model farm; have you a subscription, and to what amount?" When these preliminaries are satisfactorily arranged, the government grants the assistance required.

The societies, the chief of which is at Paris, are chiefly engaged in theoretical matters, in proposing prize essays, corresponding with other societies, &c. The associations (or comices) are exactly like our local agricultural societies; holding meetings, granting prizes for good conduct, for good management, for improved implements, improved breeds of cattle, &c. To show the rapid progress which these institutions are making, there were—

	Societies.	Associations.
In the year 1824 . .	17	41
" " 1839 . .	154	468

The government grant is generally about 40*l.* to each society, and from 8*l.* to 20*l.* to each association.

In addition to all this, with a view to attempt to naturalise the tea-plant in France, an agent has been sent to the Brazils, to collect information and to send home plants. An agent has also been sent to China, to learn the management of silk-worms, and to collect information also about the tea-plant. A distinguished

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member of the Academy of Sciences has been sent into the departments, to examine into the mischiefs done by insects, and to suggest remedies.

The expence of all these undertakings is very considerable. The gross outlay,* after deducting all receipts from various sources, appears to be as follows, calculated in English money:—

	£.
Sheep Farms	2,303
Veterinary Schools . . .	11,263
Haras, or Studs . . .	70,526
Vote of the Chamber, covering the other Items of Expence . .	32,000
Department of Government .	3,360
	£119,452

The notice, under all these different heads, has been confined within the narrowest possible compass. More detailed information on any one of them might be supplied on a future occasion.

In most of the important branches of agriculture, the rotation of crops, the breeds of cattle, and implements of husbandry, this country is no doubt far in advance of her continental neighbour; but in the discovery of chemical appliances, in the creation and management of artificial manures, their ingenuity and skill may afford us the most valuable assistance.† It cannot fail, indeed, looking at the immense surface of France, the variety of its climate, soil, and productions, when the active and acute mind of its people is turned towards these subjects, that important and most beneficial results should follow. It will befit all those interested in these pursuits in England, and especially members of the English Agricultural Society, to institute and maintain a correspondence with their farming brethren of France, which, the more intimate it should become, would redound with greater advantages to both countries.‡

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* The expence is annual, and now voted every year in the Chambers.—Jan. 26, 1840.—The Author.

† Dried night soil is very extensively used, and well prepared in France, where it is generally employed as a top-dressing. If supplied here, at a moderate expence, there can be little doubt that the objections made to it, in this country, would be soon surmounted; but the vendors charge so high for it, that farmers are deterred from its purchase.—F. Burke.

‡ The official documents from which this Paper has in part been compiled were furnished to the writer, together with much valuable information, by the kindness of Monsieur Boulay de la Meurthe, the Chief Secretary at the Office of Public Works, Agriculture, and Commerce, at Paris.—The Author.

XXVII.—*On the Application of Geology to Agriculture.*—By Sir John V. B. Johnstone, Bart., F.G.S.—Communicated by Philip Pusey, Esq., M.P.

My dear Pusey,

In compliance with your request that I would furnish you with the particulars of the geological map and survey of my Yorkshire estate, made several years ago by Dr. Smith (whose recent loss we have to deplore), with the view of enabling you to ascertain how far the facts and practical results thus obtained are likely to elucidate the necessary connexion between geology and agriculture, I have much pleasure in placing the following observations in your hands, begging you will make any use you please of them in illustrating an inquiry of so useful and interesting a nature.

In the year 1828, having observed great variations in the soils upon my estate, not only on the sides of the hills, which might be expected, but also in the fields upon the table-land forming the summits of these hills, and which, from being flat, or rather declining to the south with a gradual and easy slope, rendered the variation more difficult to explain, I mentioned the subject to Dr. Smith, who was then lecturing at Scarborough, and surveying the surrounding district, with the view of proving the identity of the Hackness strata with those near Oxford. He at once offered a solution of my difficulty by a reference to geology; and, having gone over minutely the fields in question, with a reduced map of my estate in his hands, he marked upon it, in different colours, the ranges of these strata, as they exhibited themselves in succession upon the surface, forming themselves into zones or breadths of one, two, or more fields together, according as the particular stratum which came to the surface was more or less horizontal, or more or less thick.

The result thus obtained clearly demonstrated that the value of each field, and the mode of cultivation already adopted (with the exception of the use of lime, which had been too frequently and too indiscriminately applied to the entire estate), corresponded to the variations of the strata, and were limited by the areas which these occupied on the surface; thus showing that (though the results had been arrived at by the farmers through a different process, viz., trial and error) the geological character of a country, when accurately understood, pointed out at once the natural value of the land, and the system of cultivation best adapted to it. For instance, on the highest range of my hills, a few fields, without any apparent reason, have been universally productive in all seasons, more so than the fields adjoining them on a lower level, and which appeared *nearly* of the same quality. The fossils, and other marks well understood by Dr. Smith, proved them to consist of

an insulated portion of the UPPER calcareous grit formation, which also produces an excellent tract of land in another part of Yorkshire.*

So also through all the successive divisions of the upper oolitic series, which compose this estate, it was seen that the best upland grass-land was on the peculiar zone or stratum formed on the coralline oolite through all the farms, though separated from each other by wide intervals.

We also discovered what, when followed out in other districts, may prove a most valuable fact, that the wheat is usually only thrown out in severe frosts upon those fields formed by this same coralline oolite; the same cause having no effect upon the *adjoining fields*, which are on a different stratum, lower in the series, and of a sandy nature, with no calcareous matter in them. A limestone road, as you know, lifts more in frost than a gravel road; and a different method of planting wheat upon chalk, or other calcareous soils, must be pursued than that usually adopted, if we wish to SECURE our wheat crops from failure from this particular cause.

Next we found (as is the case over an extensive district here) that the entire surface of the portion as yet left out of cultivation upon the estate was formed by the worst beds of the calcareous grit, which (notwithstanding their name) contain no calcareous matter whatever. On analysing three divisions of the calcareous grit rock at Scarborough, I find that the two upper beds are calcareous, the highest of the two in the greatest degree, probably from its vicinity to the coralline oolite, which immediately covers it; but a lower bed there, like that at Hackness, is entirely destitute of lime. This distinction should be followed out and tested in other districts, as we know that in many places the calcareous grit forms very good land; probably this arises from the calcareous beds being there uppermost. Again, when, on descending the hill-sides, it was found that there were certain fields which, whether towards the south or north, whatever the aspect,

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* I believe I have made one geological mistake in that part of my Letter which alludes to an insulated vein of land upon a high level of very superior quality, and which I have named, following Dr. Smith's opinion, *upper calcareous grit*—the highest formation in the oolitic series, and not very common. Subsequent closer investigation by other geologists, and a discovery of some fresh fossils, makes me now think that the vein in question is upon the upper good bed of the *ordinary* calcareous grit, below the coralline oolite, and which does not appear elsewhere in the neighbourhood. Whichever formation, however, of the two it may belong to, the *peculiarity* remains the same. Both strata in other districts form good land.

I have *now* no doubt whatever that the soils upon the calcareous grit formation always vary according as the particular beds of that stratum come uppermost.—*January* 17, 1840. THE AUTHOR.

whatever the local circumstances (so long as not too steep to be ploughed), invariably produced good wheat, it was a triumph for agricultural geology to discover that these fields were invariably upon the Oxford clay, or rather where the lower beds of the calc. grit become mixed up with that formation; and, comparing the comparative value and growth of timber produced upon different portions of the slopes where too steep for ploughing, it was satisfactorily established, that oaks flourished the best upon this identical stratum or zone wherever existing. It also appeared on examination that the lowest bed of this same Oxford clay was the only water-tight stratified bed on the estate, and threw out every spring on the hill sides—a fact which, had it been known some years ago, coupled with the knowledge we now possess of the thickness of the superincumbent strata, would have saved much money, expended in sinking for wells upon the highest range of these hills. The facility with which water had been obtained by shallow wells on a *neighbouring summit* had probably misled the then managers of the estate. Dr. Smith discovered that the height last named was covered with diluvium, which had a water-tight seam in it below the gravel, a few feet below the surface, and thus produced the well or spring. In this case, geological knowledge would have shown at once the different construction of the two hills. It is a curious fact that the greatest mass of diluvial matter upon the estate should be on one of the *highest summit* levels; thus giving water at an easy depth, and forming a tract of good grass land.

I may therefore fairly say, that the geological map and survey of my estate (which I allow is peculiarly adapted for such an experiment, through the variety and number of the subdivisions of the oolitic series which develop themselves successively upon the surface,) has not only explained the reason of the discrepancy between the soil and productiveness of neighbouring fields—a matter of great interest, and tending to develop the true conditions of vegetable life—but that the following positive practical results will also have been derived from it:—

1st. The knowledge of applying lime to *advantage* over the property.

2nd. Laying down fields to *advantage* to grass, and where and how to plant wheat.

3rd. What sorts of trees to plant upon each stratum. It is moreover important to possess a sort of theory of the whole series of soils, which explains many of their peculiarities, and furnishes hints for future agricultural operations.

I have before observed, that the best grass land upon the hills is upon the coralline oolite beds. The analysis of the soil generally resting on this formation is as follows, the result being ob-

tained by pursuing the methods recommended by Mr. Rham, in his article published in the first Number of our Journal (p. 46, &c.):—

Sand	77·0
Clay	11·0
Carb. Lime . . .	7·0
Humus	1·5
Loss	3·5
	100·0

Here I may observe, that this mode of analysis (according to my own imperfect trials, in which I was assisted by a chemist) gives a very good *mechanical* division of the particles of the soil, but not a chemical one, for it does not separate the clay from the vegetable matter, as may be proved by the application of the usual tests.* In testing the supposed portion of clay with sulphuric acid and potass, alumina was shown, and a sensible portion of humus also. The same tests being applied to the *humus*, several crystals of alum became visible, particularly when heated over the spirit-lamp.

There is probably more humus in the soil than is shown by Mr. Rham's analysis.

We burn chiefly the upper beds of this formation for lime, and I find that the rock contains 93 per cent. of carbonate of lime, and ½ per cent. of iron, the remainder being clay and silica, in nearly equal proportions. My geological map at once points out all those portions of the estate which consist of this stratum, and upon which there is obviously no necessity for lime; and I am thus saved from the task which otherwise I should have to encounter of analysing the soil of each individual field.

The above are a few of the more striking results which have followed from the geological survey of my estate, and may perhaps serve to show that, by pursuing a similar system over different districts of our island, the knowledge of the regular

* The observation is correct; the analysis which I gave in my prize essay was confessedly only a mechanical separation of the constituent parts of a soil. There is always a portion of humus left in the finest portion of the clay, and also of the chalk, which adheres to it by cohesion, if not by a chemical combination. In the same manner some fine particles of earth are washed over with the humus, however carefully the decantation may be effected. But this does not invalidate the result, which is merely comparative; and, with a little care, the proper correction is easily made. From the proportion of sand in the soil above analysed, if it was taken some inches below the surface, it is probable that the real quantity of humus does not exceed 2 per cent. Some portion was probably included in the 3·5 per cent. loss, and carried off with the water used in the operation. This seems not to have been evaporated to obtain the soluble portion.—W. L. Rham.

It was NOT evaporated.—The Author.

stratification of the earth may be made subservient to the systematic arrangement of those facts, trials, and experiments which societies like this will encourage and collect. It is quite clear that the results of the best local practice on different soils have never yet been generalised, nor even had the benefit of a judicious selection. Certain soils are so obviously connected with their bases, that we need scarcely ask how geology and agriculture are linked together; and to use Dr. Smith's own words, "The strata succeed each other in a certain order, and, being delineated, a knowledge of the strata becomes the natural and safe foundation of improvement; and if agricultural chemistry be ever successfully applied to the practical purposes of agriculture, it must be by proceeding with the chemical analysis of soils along the range of each stratum."

Proceeding then on the positive basis established by the science of geology, we may spread on that base a new layer of facts, with ready references to them for local use or general reasoning.

Arranged upon maps they may be readily seen, compared, and generalised. When any two parties have made experiments upon the same stratum, no matter which, a comparison can then be made. Chemists will thus be called into action, and as the different limestone soils and clays, &c. vary, so in lieu of the general terms sandy, loamy, or clayey, which are only generic distinctions of little use, specific distinctions derived from geological terms will hereafter be used.

JOHN V. B. JOHNSTONE.

Hackness, near Scarborough,
Nov. 14*th*, 1839.

XXVIII.—*On the Use of Saltpetre as Manure.* By GEORGE KIMBERLEY, Esq.

To take a retrospective view of the use of saltpetre (or nitrate of potash) as a manure, may well at the present day be considered superfluous, but it may not be amiss to remind the reader that saltpetre was known and used as long since as the time of Virgil, and we find a notice or hint of the effects of nitre or nitrous water worth the attention of farmers in the *Sylva* of Bacon, published in the year 1670. Evelyn also understood some of the advantages of saltpetre as a manure; it has also been tried and reported on by various authors down to the year 1828, when, in No. 3 of the 'Quarterly Journal of Agriculture' we find an account of its use by William Hawkins, Esq., of Hitchin, Hertfordshire, where the experiments appear very satisfactory and conclusive. Since that

time, though the use of saltpetre has been partially continued, yet it may be said, considering its value, that it has been much neglected; nor does it ever appear to have been established as a standard auxiliary manure. Mr. Cuthbert Johnson justly observes, "that the agricultural uses of saltpetre have not been examined so carefully or generally as they ought to have been." The neglect of so valuable a fertiliser when there are thousands of acres requiring such assistance, is most extraordinary, and attempts have been made by different authors to account for it. One supposes that the price may have been an obstacle; another that it was not obtained pure, and therefore the experiments failed. But my observations on the use of artificial manures generally lead me to other conclusions, and I think the history of saltpetre furnishes us with the history of nearly all artificial, but particularly saline manures, the use of which, I regret to observe, has been successively and hastily adopted, without reference in many cases to season, soil, climate, or quantity; and as a few fortunate experiments *have started into a fashion* the use of these articles, so one or two unseasonable or improper applications has at once condemned them to neglect and oblivion; and though from the advancement of science I should now hope for some more satisfactory result from the trial of that class of fertilisers, I fear that the indiscriminate use to which I daily see and hear of their being applied will again end in their expulsion from that rank in which they ought to stand, as great and useful auxiliaries to our stock of known manures. It is not my intention to make a compilation from the various authors who have written on saltpetre, but as all persons may not have seen the article above mentioned in the Quarterly Journal, I may I hope be excused for extracting so much of the report as will give some weight to my own opinions, and direct the attention of the public to so important a statement. It there appears that Lord Dacre and 10 other gentlemen and farmers have used saltpetre for different periods, varying from 15 to 3 years, on almost all sorts of crops, and though there are some differences of opinion as to its merits as a manure for wheat, yet the whole of the report may be considered as conclusive of the value of saltpetre as a top dressing; but I beg to refer gentlemen to the report itself, which will be found as above mentioned.

Now, as to my own experience, it was in the year 1827 that I first used saltpetre in any quantity, and as it is my constant practice to try every artificial manure by some standard of known value, I manured part of 14 acres of seeds in the autumn of 1826 with 10 cart-loads of good dung per acre, leaving a portion in the centre of the field to be dressed with saltpetre in the following spring. The decomposition of the dung,

and the protection it had afforded during the winter, caused the clover thus manured to be very rank and forward in growth, and far superior to the unmanured part, which looked weak and bare. I however waited till the clover had just begun to grow, and then, after having reduced the saltpetre to a fine powder, it was sown by hand on the land left for that purpose. In about a fortnight from that time I went to examine it, and could see distinctly where the saltpetre had been used: it already surpassed the part manured with horse-dung in the breadth of its leaves, and richness of its colour, which was changed to a very dark green, and it continued through the season to grow with a luxuriance of vegetation that produced a very large crop of clover, quite equal, if not superior, to that of the horse manure; nor could we distinguish any difference in the value in the succeeding crop of wheat. The saltpetre was used at the rate of 1 cwt. per acre; cost, 26*s*. 6*d*. in London; carriage and sowing included, about 29*s*. per acre. The horse manure from the farm-yard, 10 loads, or 25 yards, at 4*s*. per yard; cartage, 10*s*.; spreading, 2*s*.; making a total of 5*l*. 12*s*. per acre. The expence would have been much increased had not the field been near the farm. The trial was on sandy land of moderate quality. I could add a great number more experiments, which would be but a repetition of the above, and I have used it on spring corn with equal success. I also recommended it to a friend who tried it on oats, barley, and grass, and a few weeks after the application I had an opportunity of inspecting the crops, which were considerably higher and of a much darker green where the saltpetre had been used than the other parts of the fields, and were judged to contain from 8 to 12 bushels of corn more per acre. Its effects were equally striking on the meadow. It was used at 1 cwt. per acre.

Nitrate of potash, according to Thomson, consists of

1 atom of Nitric Acid . .	6·75
1 atom of Potash . . .	6·00
	12·75
Or (in 100 parts) Nitric Acid .	54·34 parts.
Potash	45·66

And it is said by Davy to contain 1 part of Azote, 6 of Oxygen, and 1 of Potassium.

It would be presumption were I to venture an opinion on its mode of operation, nor for our present purpose may it be necessary; a well-authenticated collection of practical facts are of more service and better understood by agriculturists. It may be asked, Do you use saltpetre now? to which I answer, Yes, and, while I

require manure, probably always shall use it, but not by itself. I consider saltpetre to be a necessary constituent and valuable component part of all manures. I can safely recommend its use alone as a top-dressing on all crops, (except wheat, which I have not tried,)* clover and all trefoils particularly, and, as far as my experience goes, as to the best method and time of application, I think it should be finely pulverised and sown with care and regularity on corn or grass, at the rate of 1 cwt. to $1\frac{1}{4}$ cwt. per acre, just when the crops begin to feel the influence of spring, and vegetation is making its first efforts. Its effects then, particularly if the weather is favourable, are as sudden as they are gratifying, and the rapid change in the colour and growth of the crop gives ample and satisfactory proof of its almost miraculous powers.

GEORGE KIMBERLEY.

Trotsworth, Surrey, Nov. 18th, 1839.

XXIX.—*Experience in the Use of Saltpetre and Nitrate of Soda as Manures.*—By the Right Hon. LORD DACRE.—Communicated by his Grace the DUKE OF RICHMOND, K.G., President.

To the Secretary of the English Agricultural Society.

SIR,

IN reply to yours, I have the honour to state, that many years ago (I should think about twenty) I used saltpetre as a manure, for two or three consecutive years. By myself it was applied solely to grass-land. The land is not favourable to pasture: it has been an old park, and the grasses not of the best quality. The effect was decidedly good: the produce, considering the nature of the soil, abundant; but I, at that time, thought that it produced a heavy crop, at the expense of the finer herbage; and, under that impression, combined with its rise of price, I abandoned the use of it. I have since resumed it, and I remain now of opinion that saltpetre does not, in effect, injure the finer herbage further than by checking its growth for the time by the weight of the stronger grasses.

I last year made the experiment of the effect of the nitrate of soda, by applying an equal money-cost of it between distinct and

* When tried as a top-dressing on wheat, it has been found to increase the bulk of straw; but in many cases to occasion mildew. See various experiments on the use of Nitre and Salt, recorded in 'Dacre's Testimonies;' and in vol. i., ch. 18, of 'British Husbandry.'—F. BURKE.

equal portions of land dressed with saltpetre. You may be aware that this nitre is rather more than 30 per cent. cheaper than the saltpetre.* I was absent from home at the hay-harvest, but my bailiff assures me that there was not a perceptible difference between the produce of the saltpetre and the nitrate of soda, applied in such proportions.

I have not myself used saltpetre on arable ground, but I have seen it applied in this neighbourhood as a top-dressing for wheat and barley. It gives great richness to the appearance of each when they are growing; but I doubt the effect upon the yield of the corn: of this, however, I have no positive knowledge.

About 2 cwt. of saltpetre per acre is an ample dressing.

I have the honour to be, Sir,

Your obedient servant,

DACRE.

The Hoo, near Welwyn, Hertfordshire,
January 14th, 1840.

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* Nitrate of soda is found in layers on the surface of the earth in the western part of South America, and is brought on mules to the coast, where it undergoes a process of refining, so that it never contains more than 5 per cent. of alloy in the original packages in the Docks of London, while saltpetre, or nitrate of potash, has come over from the East Indies, and Turkey with from 30 to 50 per cent. of alloy; it is always bought, however, by the dealers at a price calculating the refraction as alloy at 5 per cent., although the quality of the article may differ widely in its proportion of the real salt, and, in order to obtain the full extent of beneficial effects of this saline manure on the land, a genuine and pure article is indispensable. With regard to the price, nitrate of soda in the Docks is now sold by Mr. William Mitchell, of the Commercial Sale Rooms, Mincing-lane, London, at 19*s.* 6*d.* per cwt., duty paid; and saltpetre, or nitrate of potash, at 25*s.* per cwt., duty paid; calculating the refraction at 5 per cent. Saltpetre is now cheaper than it was last year, and the nitrate of soda 10 per cent. dearer; but, having been found on trial on the same soils to be equal in its effect with saltpetre, towards March both will probably advance in price, when the great consumption is likely to take place; and considering the prices of grain, and the generally known results of the manure of saltpetre for the last twenty years, it is very probable that, in spite of the disparity of price, both articles will be largely used for further experiments on the different soils. I have sold during the last year nearly 2000 tons of nitrate of soda, and the present stock in the Docks in London is under 1000 tons: of saltpetre, we have 4000 or 5000 tons in the Docks, but a demand of 1500 to 2000 tons for agricultural purposes would raise the price too high for its use.—[Note by H. F. TIARKS, Esq., Consul-General to the Grand Duke of Oldenburg, and Merchant in the City of London.—Communicated by his Grace the Duke of Richmond.]

XXX.—*Experiment on the Application of Nitrate of Soda as a Manure.*—By the Right Hon. The Earl of Zetland.

To the Secretary of the English Agricultural Society.

Sir,

I had the honour to receive your letter of the 2nd instant, intimating a wish that I would send a statement of the details of the experiment tried by me in the application of nitrate of soda for manure, for the purpose of insertion in the Journal of the English Agricultural Society.

I have had so little experience in the use of that manure that I do not think the details which I can give would be worth inserting in that Journal; nevertheless, what I do know is quite at your service. In May last I sent a ton of the nitrate of soda from London to Upleatham, in the North Riding of Yorkshire. I directed that it should be tried on wheat, turnips, and meadow-land, at the rate of $1\frac{1}{4}$ cwt. per acre. I am now of opinion that it was too late for wheat; for, although it appeared to make the straw grow stronger, I do not believe there was any material increase in the quantity of grain over the adjoining land which was not manured. For turnips, I consider it entirely failed, and was of no use whatever; but, on the meadow-land, its effects were astonishing. In the course of nine or ten days after the application it could be seen to an inch where it had been sown; and, on mowing the field, 90 square yards were measured, and the grass carted off as soon as cut, and weighed; the weight was 30 stone, of 14 lbs. to the stone. The same quantity was then measured off that part of the field immediately adjoining, which had not been dressed with the nitrate of soda; that part was cut and weighed in the same manner, and the weight of it was only 14 stone. I must add that the land was of precisely the same quality in the same field, and the whole field had been equally well manured in the winter with good farm-yard manure.

I afterwards had it tried on several meadow-fields after the hay had been carried, and the effect was very soon visible by a great increase in the growth of the after-grass; and both cattle and sheep seem to eat it greedily.

Whether the effects are of longer duration than one year, of course I am unable to state.

I have the honour to be, Sir,
Your obedient servant,
Zetland.

Aske, near Richmond, Yorkshire,
November 29th, 1839.

XXXI.—*Experimental Results on the Use of Nitre as a Top-dressing for Growing Crops.*—By James Everitt, Esq.

To the Secretary of the English Agricultural Society.

Sir,

I most cheerfully undertake to answer your application for a statement of the results I have obtained from the use of saltpetre as a manure; or, more properly speaking, a top-dressing for growing crops. It would be rather presumptuous (having used it two seasons only) were I now to hazard a definite opinion as to its permanent advantage to agriculture; this can only be determined by testing and accurately ascertaining the average results for a succession of not less than seven seasons; but, as far as my limited experience will allow me to form a judgment, I will venture to predict that, upon all *light warm soils,* it will ultimately be found to be beneficial as well as profitable: on the contrary, I have reason to believe that, on *cold clay-land,* on an average of seasons, it will not more than repay the outlay. I give these opinions not simply from my own experience, but in accordance with the information I have collected from some extensive farmers, both upon light and strong lands, upon whose accuracy in ascertaining its results I can confidently rely. I will now detail the particulars and results of the two trials I have already given it; perhaps I ought to premise that much the greater part of my occupation (1100 acres, the property of the Right Hon. Earl Spencer) is light land, with but a small portion of clay. In the first week in April, 1838, I sowed by-hand part of a field of wheat, of good light land, at the rate of 1 cwt. per acre, of East India saltpetre (nitrate of potash), for which I paid 26*s.* 6*d.* per cwt. Its effect was very visible in the course of a week, and continued very superior to that part left unsown quite up to harvest. I then had two rigs (as we term them) reaped, and kept distinct, each containing rather above 1¼ acre: the result, upon threshing, was, that I obtained an increase in favour of the saltpetre of 6½ bushels per acre, besides a considerably greater weight of straw: as I did not weigh it, I cannot accurately state the extent, but I believe I am not overrating it at one-sixth, In the first week in May, 1839, I sowed part of a field of wheat (my strongest land), and at the same time part of another field of oats (light land), with 1 bushel (about ¾ cwt.) per acre of American nitre (nitrate of soda), which cost me 23*s.* 6*d.* per cwt., or about 18*s.* per acre. I adopted the same precaution as I did the previous year; and the increase in favour of the nitre was, upon my wheat, not quite 4, and on my oats rather more than 15 bushels per acre; the difference in weight of straw (in this instance I weighed it) was

11 cwt. per acre. From these results, valuing the wheat at 8*s*., and the oats at 3*s*., per bushel, it is very evident that, in every instance, I have received a very ample return for my capital employed; the variance in the produce of the wheats I attribute to the nature of the soil, taken in conjunction with the cold wet summer we experienced in 1839: this, in a great measure, is the ground upon which I assume it is more calculated for light than strong soils. I have the opinion of a very eminent professor of chemistry, that he believes the American is better calculated for agricultural purposes than the East India nitre. Not yet having experimentally ascertained their relative effects, it is impossible to say to which I give the preference; but I have been informed by one gentleman who took that trouble, that he found the difference very trifling. I should much have preferred it if some person of more influence and greater experience than myself would have furnished you with information upon this subject; nothing but a sincere and anxious wish to contribute my humble efforts to increase the produce of our native soil, upon which so much depends the future prosperity of every landlord and tenant, could have induced me to offer these observations to the Agricultural Society. Of this you may be assured, that herein I have stated nothing but what I personally know to be strictly true: if I had, in any one instance, by false representation, practised a deception upon my brother farmers, instead of the friend I profess to be to agriculture, I should be its greatest enemy. In conclusion, I would say to every one engaged as I am, be cautious in your first trials, more particularly to those who farm upon clays. But, to convince you that I entertain a very high opinion of its efficacy and remuneration upon light lands, I have this week purchased 5 tons, which I intend sowing upon my crops in the spring of 1840.

I am, Sir,

Yours respectfully,

JAMES EVERITT.

North Creake, near Fakenham, Norfolk,
November 23, 1839.

XXXII.—*Considerations on the Rotation of Crops.*—By John Towers, C.M.H.S.

The very valuable introductory paper on the present state of the science of agriculture in England, from the pen of Philip Pusey, Esq., M.P., cannot fail to excite the deepest interest in all men of intelligence, who have at heart the prosperity of British husbandry. The facts elicited and the prospects held forth in the course of the eleven first pages are calculated to arrest the attention and to stimulate the exertions and hopes of every one; for by the experience of the past they give assurance of the future, and require no comment. But the observations which we find in pp. 12-14 inclusive must not be passed over in silence, for they refer to those operations of "succession or rotation" which are of little less moment than the quality and due preparation of the land.

In allusion to the "four-course" system it is stated at p. 13 that, "though the Norfolk, or alternate, or four-course system of husbandry has conferred such great though silent benefits on the country, it may be doubted whether that system have not accomplished all that it is capable of, and must not pass into another. Already it has begun to fail in one of its green crops, probably in the other."

I have collected some evidence in proof of this startling position, subsequent to the perusal of Mr. Pusey's article, and shall allude more particularly to it hereafter, but before doing this I beg to submit to the English Agricultural Society the scheme of a system of rotation which once excited great attention in France.* I met with it some years since in Loudon's Gardener's Magazine, vol. ii., introduced by a letter of the venerable projector (a native of our country, though residing at Paris), to the editor, from which the following is an extract:—"I now send you a farming scheme made for the French government soon after the revolution, with a view to show them how they might cultivate 100 acres of land with only 2 horses. The Directoire approved of the system, and wished to have it published, as did my worthy friend, the late M. Thouin. It was then the custom in France to sow about 70 seeds to every square foot, and, as I proposed to sow only one quarter of that quantity, the proposal was very acceptable to the Directory, who were in dread of a famine."

The other parts of Mr. Blaikie's communication are not important. The address and date, Paris, Rue de Colisée, No. 23, July, 1826.

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* This rotation would only be applicable to the richest soils, and where manure can be obtained in great quantities.—Richmond.

MR. THOMAS BLAIKIE'S SCHEME OF ROTATION UPON A FARM OF 100 ACRES, PROPOSED TO THE FRENCH GOVERNMENT.

First Year. Acres.	Second year. Acres.	Third year. Acres.	Fourth year. Acres.	Fifth year. Acres.	Sixth year. Acres.	Seventh year. Acres.
30 Wheat*	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	10 Oats 5 Barley	15 Clover	15 Wheat	10 Potatoes 3 Vetches 2 Beans	30 Wheat
	10 Potatoes 3 Vetches 2 Beans	15 Wheat	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	10 Oats 5 Barley	15 Clover	
15 Clover	15 Wheat	10 Potatoes 3 Vetches 2 Beans	30 Wheat	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	10 Oats 5 Barley	15 Clover
5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	10 Oats 5 Barley	15 Clover		10 Potatoes 3 Vetches 2 Beans	15 Wheat	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots
10 Oats 5 Barley	15 Clover	15 Wheat	10 Potatoes 3 Vetches 2 Beans	15 Wheat	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	10 Oats 5 Barley
10 Potatoes 3 Vetches 2 Beans	15 Wheat	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	10 Oats 5 Barley	15 Clover	15 Wheat	10 Potatoes 3 Vetches 2 Beans

10 Lucern,† which lasts seven years, and is then ploughed down, and succeeded by wheat.

* It can only be fine land that will bear three crops of wheat and one of barley or oats, besides potatoes and cabbages, within seven years. It would also require more manure than is usually raised upon the generality of farms.—F. BURKE.

† Lucern, it should be observed, requires a light, but fertile, soil, and a southern climate.—F. BURKE.

In presenting the foregoing table, candour requires that I acknowledge to have on more than one occasion communicated it to the public through other channels, for I was struck with its apparent comprehensiveness. I also sent a copy to the editor of the Quarterly Journal of Agriculture, submitting it to his judgment whether to publish it or not in that able periodical. He however thought it inapplicable to Scotland, more especially as lucern was not found to prosper in North Britain.

I do not conceive myself fully qualified to offer any strong opinion upon the applicability of the entire rotation to the farms of the southern and midland counties; nevertheless, when the numerical extent of the crops, the precision and order of their arrangement, and the proportion they bear one to the other, are viewed in connexion with the facts that clover begins to give way, and that the turnip deteriorates when each follows in a frequently recurring rotation, we can scarcely fail to perceive the basis of much improvement in the plan suggested by the veteran Blaikie, whose experience had, at the time he wrote, extended to "above three quarters of a century."

If it be permitted, when considering the operations of the field, to take advantage of the analogy afforded by those of the garden, much light will be thrown upon the order and agency of rotation. In the latter, particularly when the substratum of a soil is chalky, the leguminous crops must not follow in frequent succession: the pea furnishes the strongest proof of the fact; for not only is the land so soon saturated with its fecal excretions as to refuse to bring a crop to perfection, but it is found to emit a powerful and specific odour which cannot be mistaken; yet it is proved that, if peas be grown between two vegetable crops—one a perennial and herbaceous plant, as the strawberry, and the other an annual gross feeder, as the cabbage or broccoli—they may be sown year after year with perfect safety and success.

It is also found, experimentally, that the cabbage tribe rotates admirably with the potato in all strong hazel loams, for years in succession, without deterioration. If the scheme proposed by Mr. Blaikie be attentively viewed, and compared with the well-balanced succession of crops which keeps a good garden in high condition, with a very moderate supply of putrescent manures, it must be perceived that each successive crop is remedial, and serves as an antidote to its predecessor. I therefore offer it to the Society as a subject for trial on experimental farms—one from which much improvement in practice may be derived, but not by any means as a precise model. At present it lies dormant in the pages of the Gardener's Magazine, for 1830; but, if permitted to appear in the Journal of our new, and I trust most eminently useful, Society, it may also attract the attention of experimental

agriculturists, whose desire it is to ascertain facts, and become independent of mere routine. Whatever be thought of the course of cropping indicated by Mr. Blaikie, it will scarcely be doubted that, in proportion as the order of the rotation shall be comprehensive, and its crops opposed to each other in their physical organization, so will be the economy of the manure, and its energy in promoting vegetation. This I have seen exemplified yearly in the garden, where the minimum of manure, and that composed chiefly of semi-decayed beech-leaves, has produced a great abundance of fine vegetables of every description, excepting carrots, which rarely spindle well in a gritty and compact loam.

The rotation of the garden affords likewise the strongest analogical proofs of the theory of the radical exudation. Mr. Pusey has alluded to this theory at p. 12, where he observes that "crops of the same kind, following each other, become rapidly less productive, whether* by exhausting the land of some fertile property, or by depositing, as has lately been supposed, some excrementitious matter injurious to the growth of their own species, though favourable perhaps to the luxuriance of some other tribe."

For this theory we are, I believe, indebted to Professor De Candolle, of Geneva; though Brugmans had previously intimated that a certain portion of the juices absorbed by plants were ejected by their roots, after their vessels had separated the salutiferous or nutritive parts of those juices. De Candolle's hypothesis is comprehensively described in the 21st Number of the Quarterly Journal of Agriculture. Improving upon the idea of Brugmans, it perceives in this exudation of fecal matter the true theory of the rotation of crops; that this exuded substance may be regarded in some measure as the excrement of the preceding crop of vegetables, which proves injurious to succeeding vegetation. "The particles which have been deleterious to one tribe cannot but prove injurious to plants of the same kind, and probably to those of some other species, while they furnish nutriment to another order of vegetables. Hence, why one kind of corn-crop is injured by immediately succeeding another of the same kind; hence, why different kinds of crop may with advantage succeed one another; hence, in short, the propriety of a rotation of crops."

Subsequently, we find that M. Macaire made several experiments with chemical re-agents upon plants of *Chondrilla murali*

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* The query is well put, and merits experimental inquiry. For my own part, although not meaning to impugn the justice of De Candolle's theory, I must confess that I am somewhat sceptical on the subject; and in that I believe many intelligent farmers concur.—F. Burke.

Mercurialis annua, &c., after washing their roots thoroughly, and placing them in phials of pure water.* He obtained results which proved indeed that the roots, so raised and washed, absorbed and ejected certain chemical solutions; but it must be admitted that a plant of any species, when lifted from its earthy bed, is no longer in its natural situation; it becomes susceptible of the agency of foreign substances, which would have been wholly inoperative had it remained quiet and undisturbed. It has ever appeared to me that pure chemistry cannot be legitimately employed to discover or interpret the phenomena of the vital principle: its sphere of action is the analysis of dead or effete matter, and the development of its constituents; for that which destroys life cannot interpret the living functions: therefore, all experiments upon vegetables, by plunging their roots into solutions of lead, oxalate of ammonia, and lime-water, though they lead to certain chemical results, must be considered delusive, inasmuch as the exposed and unprotected fibres are placed in media quite foreign to their nature, and destructive ultimately of the vital principle. While growing in soil, a plant is in its native element, protected and defended; it is in a medium wherein it can exert all its vital functions. A young and tender balsam will live, and in a degree thrive, though the mould of its pot be frequently watered to saturation with a diluted solution of muriate of iron; but, raise the plant, and immerse its roots in that same solution, and it will perish in an hour; though, previously, the soil have assumed the appearance of rust of iron from the quantity of oxide which it has separated from the water during the course of a fortnight.

Thus it appears that no correct inference can be deduced from any phenomena which are discoverable in plants, or portions of plants, when they are acted upon by chemical agents, in situations which are unfavourable to the due performance of the vital functions. Under the impression of this fact, I was induced to take that view of the theory of radical exudation which I made public in the first edition of the 'Domestic Gardener's Manual;' and which every subsequent observation has tended to confirm. This I may now be permitted to state in few words, as I think it may in a degree corroborate the theory for which the agricultural world is now so much indebted to the talented professor of Geneva.

I had observed two plots of raspberry-bushes, the soils and subsoils of which were very dissimilar, and situated some miles apart; these I compared with a plantation of my own. The

* Chondrilla *muralis* is the Common Gum-Succory (which in the 'Hortus Britannicus' of Loudon, is Chondrilla *juncea*, or rush-leaved).—Mercurialis annua is the annual Herb-Mercury.—The Author.

two plots showed remarkable health, though the plants of each assumed a very different mode of growth. On the one (No. 1), every shrub was sturdy, but not tall, and its foliage beautifully verdant. In the other (No. 2), the canes grew to the height of eight feet, or more; the surface soil of the garden was shallow, resting on a bed of chalk. These plants "gave in:" and hardly a cane three feet high was left in the following year.

The stout plants of the other garden—the soil of which appeared to be a hazel loam over shaly stones—continued to flourish, and bore excellent fruit. My plants deteriorated gradually, though the soil was deep, and every effort was made to keep it in heart. I ascertained that the stout plants of the garden No. 1 were never permitted to occupy the same site during a longer period than five years; and that new beds were formed in regular succession by planting strong suckers in parts of the garden remote from the bearing beds, which, at the termination of the assigned period, were grubbed, cleared of roots, and put under some vegetable crop.

Comparing these facts, I arrived at the inference which I stated in the following terms:—"Particular plants convey into the soil, through the channels of their reducent vessels, certain specific fluids, which, in process of time, saturate it, and thus render it incapable of furnishing those plants any longer with wholesome aliment: in fact, the soil becomes replete with fecal and excrementitious matter, and on such the individual plant which has yielded it cannot feed; but it is not exhausted; so far from that, it is, to all intents and purposes, manured for a crop of a different nature: and thus, by the theory of interchange between the fluids of the plant and those of the soil, we are enabled, philosophically, to account for the benefit which is derived from a change of crops."—(Domestic Gardener's Manual, 1830, p. 397.)

Wholly ignorant at that period of the hypothesis of De Candolle, or that this philosopher had penned one word on the subject, I arrived, it should appear, at a corresponding deduction from facts. Subsequent observation has afforded proofs corroborative of the theory, while it has presented the means to interpret the doctrine by reference solely to natural agents and the vegetable vital principle.

1st. If we investigate the soil wherein a rank crop of any kind has grown, we shall rarely fail to detect the presence of a more or less powerful specific odour: this is traceable upon turning over the surface of a cabbage or broccoli bed, or that in the vicinity of a row of peas, beans, or kidney-beans; all the *brassicas,* and many *leguminosæ* (that is, of the *cabbage,* and many of the *bean* tribe) afford clear evidence of this fact; and the only inference that can be drawn from it is, that the ground is imbued with

substances or gases derived from, or emitted by, the roots. Persons who are inclined to doubt may readily satisfy themselves of the correctness of the statement by sowing a small quantity of peas, beans, or cabbage, in a box or seed-pan, employing the simplest light loam they can procure. After a time, when the plants shall be grown of a size fit to be removed, the earth, upon stirring it, will be found saturated with the peculiar scent which is distinctive of each species. Every vegetable, to a greater or less extent, operates in a like manner, diffusing through the ground certain substances which may justly be viewed as fecal or excrementitious, whether they consist of gaseous or fluid exudations, in the strict sense of the term, or merely of exfoliations or fibrous matter separated from the roots. The positive and specific odour is the first proof of this fact; connected with which is the deepened shade of colour imparted to the earth.*

2nd. The operation of decomposable manures offers the second proof presumptive of the excretory functions of vegetables. All these manures contain, or are resolvable into, the substance now called humus, of which charcoal (carbon) is the chief constituent and the source of colour. Carbon, oxygen, hydrogen, occasionally azote, are the ultimate elements of humus, and of all vegetable dead matter. These elements are susceptible of an infinite variety of modified combinations, when governed by the vital principle, under the stimulus of the great natural agents.

Manures, therefore, are the pabulum of vegetable life; they feed and support it: if then there be no antagonist principle in operation, the due and proportionate application of manure would, as far as food is concerned, bring every plant to perfection which is placed in a bed of earth adapted to the structure of its roots. But manure (the most perfect humus) fails to nourish; it does not, and cannot, support a crop of any individual vegetable which follows in continued or even too frequent succession;† and therefore it is clear, to demonstration, that exhaustion is not the cause of failure.

3rd. But plants which dwindle when so circumstanced, however high may be the condition of the land, succeed perfectly, and produce ample crops, when they follow others in the order of due rotation. Here, then, we perceive that nature furnishes ample

* I cannot say that I have myself ever remarked this peculiar odour, and I think it would be difficult to find any perceptible difference between the scent of a barley or a wheat stubble; though it is not improbable that land from which a rank vegetable crop has been removed, may be imbued with the smell of the decomposed roots and leaves which have rotted in the soil.—F. Burke.

† Is not this contradicted by the fact that beans and wheat, as well as beans, cabbages, and potatoes, though planted successively for years together, will produce fine crops, if the land be good and well manured? —F. Burke.

proofs of the excretory functions of plants; and, therefore, we have no occasion to call in aid the analytic powers of chemistry.

The only plausible argument that has been adduced against the theory is that of the exhaustion of the soil. It is supposed that each individual plant selects its own peculiar aliment, and therefore that rotation economises manure, and provides the supply of the several crops in due and successive order. It is quite certain that plants elaborate a certain proper juice, and effect specific characteristic secretions; but all these secretions, be they farina, starch, sugar, gum, or odorous resin, are merely modifications of the four grand elements, oxygen, hydrogen, carbon, and azote; and there is not perhaps one solitary fact which leads to the belief that the common or raw sap imbibed by the roots contains any characteristic principles. This is usually supposed to be little more than water, holding carbonic acid in solution; a fact which, assuredly, cannot be determined by experiment, but at the same time is more in accordance with electro-chemical principles than the opinion that each individual plant deprives the soil of some sort of aliment peculiar to its own habits and constitution. Exhaustion is certainly effected by vegetable action, but to understand the term aright we must consider that the earths proper undergo little or no change; that all manures (or humus) are resolvable into the elements of vegetable substance; and, therefore, are elaborated by the vital energy of plants into sap, and in that state are absorbed by their roots. All decomposable matters can be and are thus gradually removed from the earths with which they have been incorporated by the labour of man, and, so far, the land may become exhausted; but any one individual plant will cease to thrive if repeatedly planted in the same spot long before this state of exhaustion shall be brought about; the ground itself becoming at the very time imbued with that peculiar odour which indicates the excretory power of the roots.*

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* Although it is not improbable that the observations lately made on this subject by M.M. De Candolle, Macaire, and other vegetable physiologists and chemists, may be attended with future benefit in regard to a more regular course of cropping in the alternate system, yet the main object of cultivation, besides the necessary attention to the management of the soil, must ever consist in supplying the land with a sufficiency of manure to prevent it from being impoverished. "The main object of all rotations should therefore be, to establish such a series of crops as, by preventing the too frequent recurrence of any one of those which are considered exhausting, shall guard against the dissipation or loss of those component parts, or qualities of the soil, which seem peculiarly adapted to the growth of each, and in the abundance of which consists its fertility. The precise nature of those qualities, or rather the causes which influence their peculiar effect on plants of different species, has not been ascertained; indeed, has been only vaguely conjectured; and all the researches of chemical science on the subject have ended in proving little more than what was already known by experience; viz., that certain plants can only be grown with ad-

To recur to Mr. Pusey's observation on the incipient failure of the "four-course" system, I beg to allude to an existing fact, which bears directly on and confirms that gentleman's statement. A neighbouring farmer, with whom I am well acquainted, and whose fields almost join my own property, had, in the late summer, a noble breadth of barley, of full 40 connected acres, with broad clover. In the centre of this piece, a strip of about 3 or 4 acres was sown in the autumn of 1837 with *trifolium incarnatum* (crimson clover). The terrible frost of January 1838 (2° below zero) cut this plant into patches, but by far the greater portion grew, and bloomed, though it always was dwarf. The farmer assured me that, as respected manure, the piece was the richest of the field. The barley of this year was in every part fine alike, and was safely harvested about the close of August. From that time the clover began to grow freely, but it became apparent that the plant which was on the small portion of the field that had been under *trifolium incarnatum* in 1838 was comparatively weak. A foot-path crosses this piece through its whole length, diagonally, so that every part of it is brought into sight. The stubble of the barley is now, and has been for weeks, surmounted by the rich herbage of the clover in every part of the extensive breadth, with the single exception of the trifolium piece; there it is seen still high above the clover, marking, as by a boundary line, the exact limits of the piece.

The proprietor ascribes the weakness of the present crop entirely to the trifolium, though he does not reason on the subject as in any way connected with the theory of radical exudation.

One other circumstance only remains to be mentioned. Here and there one may perceive an irregular patch of clover overtopping the barley-stubble, and looking verdant as the plant of the great breadth. I would not take unwarrantable advantage of a fact whereon the memory cannot retain sufficient evidence; but certain it is that the trifolium perished in patches, and it would not be unfair to conjecture that the places so left bare were not poisoned for clover by the fecal exudations of the previous crop.

I offer the foregoing remarks with all due humility, and in the hope that they may induce further inquiry into the philosophy of the great law of Rotation.

JOHN TOWERS.

November, 1839.

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vantage on certain soils, and can only rarely be continued without evident diminution of their amount. Yet the 'Theory of the rotation of Crops' still holds out a wide field for research; and, if followed up, bids fair to solve the problem of vegetation." See vol. ii., ch. 6 and 7 of 'British Husbandry;' in which will be found extracts from Von Thaer's luminous essay on soils and rotations, translated from his '*Principes raisonnés d'Agriculture*.'—F. BURKE.

Note by the Rev. W. L. Rham.

The following rotation, which has been adopted, and religiously adhered to, in the neighbourhood of Lille, before any of the present generation were born, is given in the notes to the last edition of the 'Theatre d'Agriculture' of Olivier de Serres, p. 184; published at Paris in 1804.

The quantity of land is 15 bonniers (about 60 acres); each bonnier is divided into 16 cents: each cent is, consequently, nearly ¼ of an English acre.

ROTATIONS OF CROPS FOR FOUR YEARS.

First Year.	Second Year.	Third Year.	Fourth Year.
Bon. Cent.	Bon. Cent.	Bon. Cent.	Bon. Cent.
0 12 Colsa plants		0 1 Clover	
0 6 Turnips	1 8 Oats	0 8 Flax	
0 6 Cow cabbage			
	1 0 Tares		
	0 8 Rye		
	0 8 Winter barley	2 8 Colsa	4 8 Wheat
	0 8 Clover		
4 8 Wheat	0 4 Potatoes		
	0 2 Beet root	0 8 Beans	
	0 2 Carrots		
	0 12 Colsa plants		1 0 Clover
	0 6 Turnips	1 8 Oats	0 8 Flax
	0 6 Cow cabbage		
		1 0 Tares	
		0 8 Rye	2 8 Colsa
1 0 Clover		0 8 Winter barley	4 8 Wheat
0 8 Flax		0 8 Clover	
2 8 Colsa	4 8 Wheat	0 4 Potatoes	0 8 Beans
0 8 Beans		0 2 Beet root	
		0 2 Carrots	
		0 12 Colsa plants	1 8 Oats
		0 6 Turnips	
		0 6 Cow cabbage	
1 8 Oats	1 0 Clover		1 0 Tares
	0 8 Flax		0 8 Rye
1 0 Rye & Tares			0 8 Winter barley
0 8 Rye			0 8 Clover
0 8 Winter barley	2 8 Colsa	4 8 Wheat	0 4 Potatoes
0 8 Clover			0 2 Beet root
0 4 Potatoes			0 2 Carrots
0 2 Beet root	0 8 Beans		0 12 Colsa plants
0 2 carrots			0 6 Turnips
			0 6 Cow cabbage
15	15	15	15

See also the rotations in 'Outlines of Flemish Husbandry,' p. 25.

It will be observed in this table that, except in the case of a small portion of rye and winter barley, most of which is cut green for the cattle, every plant is succeeded by one of a different family.

The principal objects of cultivation are wheat, rape-seed (from which oil is expressed), and flax; and these occupy exactly one half of the land. The other half is devoted to roots and green crops for the cattle, which are necessary to produce the manure required for the principal crops, and to keep the land in good heart.

Here simple experience, without science, has anticipated the rules which have been since proved to be most advantageous; and a perfectly scientific rotation is the result of long experience and attentive observation alone.

This system must have been noticed by every observant traveller, and has been mentioned in many publications. Yvart, in his excellent work 'Succession de Cultures,' which forms the whole of the 12th volume of the 'Nouveau Cours complet d'Agriculture' (Paris, 1808), continually alludes to it; yet nowhere has it been followed but where it was first adopted. It has scarcely been noticed in English agricultural publications; and if some individuals, who read foreign agricultural works for their own satisfaction, have known it, they had no good opportunity of communicating the information to the English farmer, for want of a vehicle such as now presents itself to all important aud useful communications, in the Journal of the English Agricultural Society.

W. L. Rham.

Jan. 27, 1840.

XXXIII.—*Experiment on Narrow and Wide Drilling of Wheat.* Communicated by Thomas William Bramston, Esq., M.P.

To the Secretary of the English Agricultural Society.

Sir,

The comparative advantage of narrow and wide drilling occupied much attention in many parts of Essex in the year 1838. I send you the result of an experiment, carefully made by Messrs. Dixon, in the neighbourhood of Witham, who farm highly. If you think the details are of sufficient interest to deserve publication, I am authorised to say they are much at your service.

I am, Sir,
Yours faithfully,
T. W. Bramston.

Skreens, near Chelmsford, Essex,
December 8th, 1839.

Trial of narrow and wide drilling of Wheat, sown on the 16th of Oct. 1838.—The quantity of land drilled was 3 roods and 37 poles; half of which was drilled with 13 rows on a stitch, 10 feet wide, the other half with 19 rows on the stitch; the land being divided into 4 stitches.

The same quantity of seed was used; viz., at the rate of 3 bushels per acre, which produced, from the

	Bsh.	pks.		Sts.	lbs.
19 rows, 348 sheaves...	23	1¾	...weighing (nett)	106	8
13 rows, 374 sheaves...	21	0¾	...weighing (nett)	96	8
Bushels...	2	1	Stones...	10	0

The 4 stitches were alongside of each other, and were all cut by the same men, and no perceptible difference in the size of the sheaves.

The 13 rows did not stand so well as the 19 rows, but were a shade the better sample, weighing about one-sixth of a pound per bushel more.

The soil was mixed. The sort of wheat was Golden Drop.

XXXIV.—*Practical Essay on the Diseases of Sheep.*—To which the Prize of Ten Guineas was awarded by the Saffron-Walden Agricultural Society, in Sept. 1839.— By HENRY CLEEVE, of Rawreth Hall, near Rayleigh, Essex.

[Communicated by the Right Hon. Lord Braybrooke, President, and the Committee of the Saffron-Walden Agricultural Society, as the best practical Essay on the Diseases of Sheep, for the Prize offered, in 1836, by Henry John Adeane, Esq., one of the Vice-Presidents.]

THE most convenient way for a practical man to convey practical information in a compendious form is to disclaim all pretensions to scientific arrangement. Farmers are not always men of leisure, and their literary pursuits are too limited by opportunity to admit of their studying many branches of knowledge essentially connected with their business. Among these may be included comparative anatomy and the pathology of the animal creation.

It is proposed therefore to enter into a succinct enumeration of the diseases of sheep, a short explanation of their causes and symptoms, and a description of the treatment which I have either from my personal experience found successful, or have understood to be so on the authority of intelligent friends. I shall add a few remarks on the selection of stock and the more important points connected with breeding.

Some of the diseases of sheep are almost peculiar to them, and comparatively unknown in other descriptions of stock: others arise from accidental causes, to which all animals are equally liable, with slight variations as to the symptoms. So far it seems expedient, with a view to clearness and precision, to arrange my subject. I will therefore insert them in the following order:—

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WATER IN THE HEAD is often confounded with the next disease to which I shall refer, namely, turnsick, or goggles; but the two complaints are essentially different. Water in the head is more

frequent with lambs than with adults; indeed it very rarely occurs except in lambs. It consists of an accumulation of fluid in the ventricles, or between the membranes that envelop the brain. It is perhaps hereditary, and is most generally caused by poverty of blood, or, in other words, general debility in the ewe, arising from insufficient feeding. The symptoms are dulness, want of appetite, enlargement or, rather, distension of the skull, and a heavy languid appearance of the eye, which sometimes projects unnaturally. It rarely admits of cure, unless by the natural supply of abundant milk from the mother, or from a foster-mother, with the administration of aperient and tonic medicines. The lamb generally dies from weakness. My principal motive for describing the complaint is to caution the farmer against breeding again from the mother.

TURNSICK, or GOGGLES, is sometimes termed by shepherds the GIDDY, or the DUNT.* This is also a complaint of the head, but affecting sheep more than lambs. It is essentially different from the last disorder in its symptoms as well as its cause. It usually appears when the sheep is about attaining its first year, though it is by no means confined to that age. It proceeds from the presence of hydatids in the brain. They are lodged in a

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* Vancouver, in his Survey of Devonshire, thus describes the Goggles in Sheep:—

"The symptoms are more discoverable in the morning, when the animal first rises from the ground, by an evident weakness and difficulty in raising its hind quarters. This complaint continues for some time, getting worse and worse, until the animal can move its hind parts no longer; it then lies prostrate on the earth, but looking constantly backwards, and making continual efforts to bite and nab the wool towards the loins, and where there is evidently seated a most excruciating pain. In this condition the animal very soon expires. No remedy or means of prevention have as yet been suggested to avert this deplorable malady."

Should I have been mistaken in classing Goggles and Turnsick under one head, I think the term "Goggles" must be misapplied, and those provincial terms are very confounding. What Vancouver has described appears to me to be a paralytic affection. I recollect the complaint, but never heard it named the "Goggles," the term "Shrew-croft" being commonly used to designate the disease.—THE AUTHOR.

I have seen a great deal of this affection in our own neighbourhood, and have had my own flock seized with it several times. The easiest and most effectual way not only to cure it, but to prevent its progress, is to take some common tar and place it between the eyes of all the sheep, spreading it down to the nose, and it is astonishing to find how soon they recover; nor will any of the other sheep, having the tar applied in this manner, be liable to have the complaint.—WILLIAM GREAVES.

[This and the other notes of Mr. Greaves of Bakewell, (a Derbyshire tenant of his Grace the Duke of Rutland), who has had considerable experience in the diseases of horses and cattle, and paid much personal attention to the management of his own stock, are communicated by his Grace the Duke of Richmond and the Marquess of Downshire.]

sac or bladder, filled with a watery fluid, and the pressure of this bladder on the brain occasions the peculiar symptoms by which the complaint is recognised. The affected sheep has a wandering, staggering, and insane appearance; he carries his head on one side, and hence has a difficulty in feeding; he appears absent in mind, and has a circuitous walk, resembling a horse while being lunged. There is an important distinction to be noticed between the symptoms of this complaint and the general indications of cerebral disease. Occasionally the sheep may be properly called delirious. An unnatural wildness, at times almost amounting to ferocity, appears to govern the animal's movements: but here a heavy dull langour is the first apparent symptom. The disorder is slow in its progress, the patient languishes on for many days, and even weeks, and at length dies as if pining away from a low and diseased condition of the system. The eyes are usually prominent. When the animal is driven he takes the circular route I have described. The complaint is not, even in its *advanced stages*, attended by violence or extreme agitation, but rather by an increasing and settled depression of spirits. It is more frequent in wet lands than in high pastures, and especially in undrained soils.*

It is sufficiently obvious from the description of the symptoms that the disease is beyond the reach of medicine. The brain in all the animal creation is very destitute of absorbent vessels, and were it otherwise, it would be difficult to promote the absorbent action by medicine in this case, because the fluid is contained in a closed cyst, and is part of the living animal. Hence the farmer has been led, but with little success, to the adoption of mechanical means for the purpose of opening the vesicle containing the hydatid, and thereby removing the pressure of the fluid on the brain.

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* The author, in his description of the goggles, states that some shepherds call it the giddy, and this is the term which we employ in Berkshire. The best means of prevention, with which I am myself acquainted, is to make a judicious crossing of blood from different well known stocks. The goggles is a disease of quite a different character; the first symptoms of it are the following: the animal begins rubbing the wool round the tail, not turning round as the giddy sheep does, but stumbling along in a straight direction, and as the disease increases, the animal staggers a short distance, then falls down, sometimes on its head and at other times on its side, rolling quite over. In the last stages the teeth turn quite black, and the sheep then soon die. I am of opinion that this disease is infectious. I once knew a flock of 200 sheep, 64 of which died goggly; they were bled, and opening medicine given them, but it did no good.—W. Humfrey. [This and the other notes of Mr. William Humfrey, a gentleman of much experience in the management of sheep, of Boxford, near Newbury, Berkshire, are communicated by the Marquess of Downshire.]

I have no hesitation in saying, that in the few instances in which the rude operations employed for this purpose have been successful, it is to be attributed more to accident than to skill. If it were possible to ascertain with certainty the exact position of the vesicle, the operation of trepanning might be safely resorted to. Mr. Smith, of Southam, is said to have repeatedly performed this operation successfully.* It is to be done by making two incisions, so as to form, when united, the letter T over the somewhat softened part of the skull, supposed to cover the hydatid. Turning the angles of the skin back, by dissecting them from the bone, the latter is now to be pierced by a trephine, and the portion of bone removed. This done, the brain will be exposed, and the hydatid, if at the part, will rise up covered by the *dura mater:* this must also be cut through and turned back, and the parasite punctured with a fine curved needle carrying a thread. As soon as it has shrunk up it may be gently drawn away by means of the thread, and the *dura mater* and skin replaced over the part; the edges of the latter being held together by a stitch or two, and covered with a cap. The portion of the bone must not be returned. A very rude, and, although I have practised it myself, I must say cruel operation, allied to the trepanning principle, has sometimes though rarely proved useful. It is called "wiring," and consists in passing a wire or knitting-needle up the nostril, and through the perforated plate of the ethmoid bone into the brain. This is no certain or easy task, for although the passage is straight, it is narrow, and if the needle deviates from its path in a very slight degree it will be stopped by a projection of the frontal bone from above, or the solid portion of the ethmoid bone below. But, assuming that the perforation is effected, its success must depend on the position of the vesicle; for if it should happen to be situated too superficially, or too deeply, or in fact anywhere out of the direct line of the needle, it will not be punctured, and, of course, the fluid not being removed, the pressure on the brain will continue, while the puncturing is of itself likely to occasion fatal inflammation.

Other attempts of a mechanical nature have also been made, but with yet more doubtful results, and scarcely more humane in their character. Some farmers have cut off the ears after severely wringing them; others have dogged the animal, and worried it to exhaustion. The principle of these and similar barbarous and general experiments is the same—to create that violent and convulsive struggling in the animal that may perchance rupture the

* Lectures on the Morbid Anatomy of Serous and Mucous Membranes, by Dr. Hodgkin.—vol. i. p. 185.

vesicle wherever situated; a disgraceful, and generally useless, mode of treatment.*

It is probable that in a very large majority of cases where recourse has been had to these violent remedies, immediate death has followed, even where the vesicle has been broken. I can only recommend prevention instead of surgical operation, by selecting as far as possible dry and well-drained pasturage, and paying careful attention to the choice of breeding stock. It is considered by well informed men that the disease is far less prevalent than formerly, and its decline has been attributed to the great improvement in our agricultural system that has, under the patronage of influential men, been made of late years. "Sturdy" is a name often given to this disease, as well as to the last. There is no question however that the two complaints are distinct, and proceeding from different causes, though, affecting as they both do, the same organ, many of the symptoms will correspond. Some degree of difference, however, is to be found in the degree of rapidity with which the disorder advances. Water in the head will sometimes continue for many months before it terminates fatally, but the turnsick, or goggles, properly so called, will occasionally carry off the sheep in a very few weeks.

Apoplexy proceeds from pressure on the brain, by the sudden determination of blood to it, occasioning the rupture of some blood-vessel. In sheep this generally occurs when on the road to market. They are then in high condition, and often overdriven beneath a sultry sun. The drover should carefully watch any sheep that lags behind. If it appears stupid and unconscious, heedless of the dog and forgetful of its companions, it should be instantly and copiously bled from the neck: a prompt flow of blood is indispensable in this case. Every surgeon knows that the loss of the same quantity of blood taken away in three minutes will have much greater effect than will be produced if it is allowed to dribble away in twice the time. If the sheep is on the road to the butcher, nothing further is necessary; but, should it be attacked at home, the shepherd must change its pasture, and keep the bowels freely open by repeated doses of Epsom salts.

This disease, when occurring at grass, the sheep being in high condition and the pasturage luxuriant, is sometimes called the

* The cruelty of such operations, even if successful, ought not to be encouraged, particularly as from the very nature of the disease the operation may not produce a thorough cure; because the origin and mode of development of hydatids are involved in great obscurity; but though first formed in an unknown manner, they are capable of re-producing their species, probably by germination, and that power is spread over the whole surface of the cyst.—James Dean.

Blood. There is nothing so dangerous as that extreme state of condition to which our sheep and other animals are sometimes brought. When every vessel is filled to the uttermost with blood, those of the brain press upon the nervous system, and life is suspended or lost.

Epileptic Fits sometimes, but not frequently, attack sheep; when they do it is usually in the spring of the year. They are known by the suddenness of their attack, and the giddy, convulsive staggering of the animal. It recovers, however, in the course of a short time, and returns to its food. If the fits recur, treatment similar to that which I have recommended in apoplectic cases will afford relief, though the bleeding need not be so copious, unless the intervals of attack are very short.

Palsy appears to proceed from exposure to severe frost, particularly in lambs soon after their birth, and ought rather to be called chill or numbness, as it has no necessary connexion with direct injury to the nerves, unless in cases similar to those I am about to mention. As the complaint arises from cold, a restoration of warmth, but by a gradual process, will generally remove it.* In the following cases Palsy would seem to have been entirely caused by the food. I had been giving two cart-loads of mangel-wurzel daily to about 150 couples. Finding the pasture get short, I one day ordered an extra load, and the following day I found that 13 of the ewes had nearly lost the use of their limbs. On another occasion, having some hoggets that would not eat the root, I enclosed them in a pen, in order to starve them to it; but, as soon as they began to feed heartily they also were similarly affected. If I rightly attribute the complaint to this cause, and, indeed, I have no doubt on the subject, the treatment is to withhold the mangel-wurzel for a short time, and only to return to the use of it gradually and in small quantities. I bled the animals that were affected, and gave to each an

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* Palsey does *not*, in my opinion, arise from exposure to cold; but, in lambs, is caused by the bad state of the blood of the ewes at the time of lambing. I have known it occur on the dryest as well as wettest soils, in warm as well as cold weather. Two years since, I had about fifty ewes put to the ram early. In consequence of the severe frost, and the turnips being rotten, I was afraid to let these forward ewes have any, and they were kept on hay; the hay being very good, they ate a great quantity, throve very fast, and their blood was in too high a state. Nearly half of their lambs were taken with swelled joints and sore mouths and ears; and, whenever a lamb bit the teat of its mother, it was sure to fester: but, after a time, when they had been cooled and purged by young grass, they recovered, and did very well. Of the remaining 550 ewes that had a few turnips with the *same* hay, no lambs could be more healthy.—John Ellman.

[This and the other notes by John Ellman, Esq., are communicated by his Grace the Duke of Richmond.]

ounce and half of Epsom salts: with one exception they all recovered under this treatment.

Palsy sometimes, but not frequently, proceeds from pressure on the brain caused by the pressure of the hydatid. In such cases, the original disease being for the most part incurable, the palsy that it occasions is equally past the aid of medicine.

RABIES.—When wounds arise, as they often do, from the bite of the dog, some attention is requisite.* It would be prudent to break the fangs of every savage sheep-dog; for the loss to the animal is of no importance, compared with the safety of the flock. It is a good rule, in every case where a dog has severely bitten a sheep, and particularly if he has worried the flock, to extirpate the wounded part without delay, or to apply the lunar caustic to the wound, taking care that it shall come in contact with every part that the poison can have reached. The caustic can be more readily used than the knife. The sooner this is done the better; but no lapse of time should deter us from operating, for, fortunately for the quadruped and the biped, the poison is slowly absorbed.

Whenever rabies appears it is inevitably fatal. It admits not of even temporary relief. Agitation almost amounting to ferocity, indescribable wildness of manner and look, a large flow of saliva and froth, and unconscious delirium, are the usual symptoms. The time of their appearance varies from the third week to even the fourth month after the bite. After sheep have been decidedly worried by a suspicious dog, they should be shorn, and the skin most carefully scrutinised for the marks of the bite, for the very smallest wound will be sufficient to cause infection. At the same time it must be admitted that there is less danger in wounds through the fleece, because the teeth of the dog will probably be cleaned of their poisonous liquid, by passing through a thick wool. The farmer must take his chance of this, if he

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* Much of the injury arising from the dog's biting the sheep might be prevented by proper training, and more careful management. The treatment recommended by the author, in case they are bitten, appears to me to be very judicious.—W. HUMFREY.

Having been much in Spain and Portugal, I have there observed that the sheep-dogs, which are of a powerful and savage nature, are solely employed to guard the flocks from wolves, and are never allowed to bite the sheep when collecting them together. This is, of course, the effect of instruction, and there can be no reason why it should not be adopted with equal benefit in this country. The Spanish shepherd, indeed, teaches some of the rams to come to him by name; and when the flock is required to move, he calls one of them forward to follow him. The flock naturally, also, follows the ram, and the shepherd, marching a-head, *leads* instead of *driving*.—F. BURKE.

I should recommend the flock-master not to keep a *savage* sheep-dog.—RICHMOND.

thinks the shearing too hazardous or too unseasonable an experiment.

I will now mention two cases of severe loss occasioned by the bite of mad dogs, one of which I copy from the 'Bristol Mirror:' the other occurred some years since to a person with whom I was acquainted. I notice them to impress more forcibly on my readers the necessity of my previous cautions:—

"On the 22nd March, 1838, early in the morning, Mr. John Reeve, of Rudway Farm, in the parish of Stapleton, had twenty-three of his sheep and lambs worried and bitten in a frightful manner by a dog belonging to a poor neighbour, who concealed her apprehensions of the rabid state of the animal till the event proved the certainty. Being caught in the fact of biting the sheep, the dog was shot at, but, receiving only a portion of the charge, was still able to run home, where it was pursued and eventually destroyed. So severely were six of the lambs bitten, that they either died or were obliged to be killed the same day. No apprehensions being entertained by the farmer that the dog was mad, the wounds of the sheep were merely dressed. On Saturday (21st April), however, symptoms of hydrophobia manifested themselves in the poor creatures, and one of the lambs died; on Sunday a second died, and on Monday a third lamb died, all mad. On Tuesday three ewes were obliged to be destroyed; on Wednesday two ewes and four lambs were killed; on Thursday two ewes and two lambs died, all mad; and it is feared several others must be destroyed. We understand also that, about two months ago, Mr. Jones, of Stapleton, met with a similar misfortune, and had upwards of a score of sheep and lambs bit in the same manner, and that several of them also died mad."

The other instance happened to a respectable farmer of the name of Hodge, residing within three miles of Exeter, who lost a considerable number of valuable ewes from the bite of a rabid dog. It was several weeks from the first attack until the disorder stopped. He killed the animal in the act of worrying the sheep, but took no precaution to prevent the malady.

The Eye of the sheep is liable to many diseases, but for the most part they are symptomatic of other complaints affecting the constitution, and will disappear when the constitutional disorder is removed. Amaurosis, or paralysis of the optic nerve, is often the result of apoplexy, or of water in the head. The scab, when it reaches the head, will leave considerable soreness in the eyelids, and some other diseases will leave their traces on this organ; in all such cases relief may be given by a zinc lotion (Appendix, No. 8), but a cure can only be expected in a removal of the original disease. The complaint called Blindness, to which sheep are much subject in some of the western counties, is an

inflammatory affection of the eyes, causing, as its name denotes, a partial or total loss of sight. It sometimes appears an epidemic disorder, as most of the flocks in the neighbourhood are attacked with it about the same time. Nature generally effects a cure in a few days. I have found it necessary, when the complaint is more obstinate, to bleed from the vein formed in the angle of the eye, and bathe the eye with the zinc lotion, as recommended for the preceding complaints; but nothing can be more injurious than the application of any irritating substance to this tender organ, such as glass, or even powdered sugar. Wherever inflammation is found, all such applications have a direct tendency to increase it; for, although the eye itself is not possessed of much sensibility, the lids are particularly susceptible of the least approach of any particle of dirt or other substances, nature having endowed them with this peculiar sensitiveness to make them rapidly shut, for the better protection of the sight.

Another disease, allied to the scab in its outward appearance, but not springing from the same cause, nor yet contagious, has been called BLACK-MUZZLE. It is an erysipelatic eruption on the nose, sometimes extending up the face. In lambs it has been attributed to a cutaneous affection of the udder or teats of the dam, whether justly or not I have never had an opportunity of observing; but, as it is always confined to the face and generally spreads from the nose, it is probable that it proceeds from some cause connected with the feeding; it is not peculiar to lambs, nor is it of common occurrence at any age. The mild mercurial ointment given in the Appendix (No. 1) will cure this complaint with very little trouble.

A complaint known in the midland counties by the term black-leg, which I never met with, has been described to me as an enlargement of the legs occasioned by the deposit of a fluid, of the consistency of jelly, immediately under the skin. It is probable that this is a dropsical effusion of serous fluid, and merely symptomatic of general debility; I cannot, however, pretend to give any satisfactory explanation of either the cause or the nature of this complaint. It would be best treated by mild purgatives and tonics.

Sheep are sometimes liable to a disorder in the mouth, occasionally extending to the fauces, that has been called the THRUSH. It has been supposed by some persons to be intimately connected with the foot-rot, the thrush often appearing at the same time that the foot is affected. This is plausible, for the sheep being in the habit of licking its foot when sore, may suck in some of the acrid discharge, and thereby occasion those vesicles in the mouth that constitute the complaint; the symptoms of which are refusing food and general lassitude, arising perhaps from inability to feed.

Alum, dissolved in water, applied as a lotion to the mouth, will speedily remove the tenderness that prevents feeding; and, if promptly resorted to as soon as there is reason to fear the existence of the disease, will effect a cure before the condition is much reduced

The HOVE, or HOVEN, or BLOWN, is a distension of the paunch by gas. The gas is generated by fermentation of the food, especially cole-seed, turnips, or clover, if largely eaten before the sheep has become accustomed to the diet. It resembles the distension of the stomach by too much food; but there are evident distinguishing differences which it is important to notice, because the remedies in the two cases are very different. Where the paunch is overloaded with food the animal is much distressed, though the swelling is less marked; and when the flanks are handled, there is less elasticity perceived: but where the distension proceeds from gas, the elasticity is very great, the whole abdomen is enlarged, and the skin has the tightness and almost the reverberation of a drum when struck by the hand. The breathing is laborious from the action of the diaphragm, which separates the lungs from the stomach, being impeded. The remedy, in the case of the loaded stomach, is obviously to relieve it of part of the contents by exciting vomiting, if it can be effected: this, I have understood, is sometimes successfully done by the infusion of warm water by means of a stomach-pump in large quantities. If relief cannot be obtained in this way, the paunch should be opened at the flank, and a considerable portion of the superfluous food removed. The wound made for this purpose must be stitched together, and a pitch-plaster applied as an external covering. And here I would wish to remark that one of the principal causes of this complaint is occasioned by turning sheep upon the stubble immediately after harvest. The corn which they pick up, particularly wheat, by its swelling distends the stomach and prevents it from performing its proper functions, even when assisted by medicine. No other resource is therefore left but that just described. To prevent this complaint the shepherd must be careful not to turn his flock into the stubbles until the grain has sprouted, when all danger ceases.*

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* As a preventive for sheep becoming blown, it is an excellent plan to sow common salt over the fold which contains their food, early in the morning while the dew is on it. In the year 1836, I experienced its good effects while feeding off a piece of rape, having lost several lambs by their being blown. I bought a sack of salt and had it sown over the fold every morning before the dew was off: and the consequence was that I only lost one sheep afterwards, and this occurred by accident, the shepherd, through neglect, allowing it to run into the rape which had not been salted. There are two advantages to be derived from this simple remedy: it not only

The treatment of hove, or distension from gas, is very different. In the first place, it must be remarked, that though hove, in its aggravated form, suddenly follows an excess of fermenting food, it is often a dyspeptic symptom connected with other disorders: attention should therefore first be given to the general state of the sheep, and especially to the abruptness of the attack. If the animal has previously shown a reluctance to feed, or general dulness without any perceptible cause, or a disordered state of the stomach, it may be safely assumed that the hove only indicates the seat of some other disorder, which must first be removed, and then the distension will subside. But if this distension is very rapid and decided in its appearance, and if it follows immediately upon the change from poor pasture to rich clover, the fair inference is that gas has been extricated without any previous derangement of the stomach from other causes; and it must be promptly discharged by puncturing the paunch. This may safely be done with a proper instrument. It is usually effected by a knife; but to this there are serious objections—a larger incision is made than is necessary, and when, by the expulsion of the gas, the paunch is reduced in size,—the wound through its coats no longer corresponding with the external orifice in the skin,—portions of the food are discharged with the gas into the abdomen, and remain lodged there, a permanent source of mischief. If, on the other hand, the puncture is effected by an instrument called by surgeons a trocar, and used by them in tapping for the dropsy, the gas is entirely discharged through the external wound. The trocar consists of a sort of dagger, which is sheathed, except at the point, in a metal tube; the puncture is made by the dagger when thus sheathed. The trocar is then withdrawn, but the sheath remains; and through its tube a regular communication is preserved with the external orifice, notwithstanding the reducing of the stomach when the extrication of gas begins to subside. Another mechanical process, often adopted with success, and in some respects more eligible than the trocar, is the introduction of a tube into the stomach through the gullet. The tube used for this purpose is made by twisting iron wire, of a very fine diameter, close round a smooth iron rod, about a quarter of an inch thick, that may be withdrawn at pleasure. After the frame of the tube is thus made of sufficient length, it should be covered with smooth leather, so as to make it air-tight, and prevent wounding the gullet in passing it. The gas will discharge itself through this tube, and the animal be instantly relieved. But it sometimes

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directly benefits the general health of the sheep, but all that falls on the ground acts as manure, so that nothing is wasted.—W. Humfrey.

The salt might also be placed in troughs in the field.—The Author.

occurs that the ease thus obtained is only temporary, and the manufacture of gas may continue undiminished; it is then obvious that some method must be resorted to to prevent its accumulating. An injection of chloride of lime, to the extent of a drachm in half a pint of water, administered through the tube before it is withdrawn, will, by chemical affinity with the hydrogen, have the desired effect. After the sheep is relieved, 2 ounces of Epsom salts should be given.

In the earlier stages of hove, I have found relief derived from keeping the sheep in constant brisk motion; this is supposed to cause a relaxation of the pillars of the roof of the paunch, which allows the gas to escape into the œsophagean canal and through the gullet: it may however be doubted whether this remedy is beneficial for any other reason than that it interrupts the feeding, and prevents in consequence an accumulation of gas more rapidly than the animal can bear. I have also experienced good effects from giving 2 or 3 ounces of castor oil combined with 2 drachms of ginger. There can be no harm in trying these milder remedies before resorting to mechanical means; but if the distension rapidly increases, no reliance can be placed on any treatment without operating. Sheep should not be first turned upon clover or other luxuriant pasture when in a hungry state.* This simple precaution will generally prevent the access of the disease.

Diarrhœa and Dysentery.—The distinction between these too frequent and dangerous diseases of the sheep is, that the first is mostly confined to the mucous membrane of the small intestines; in the other, the large intestines are involved, and the inflammation is more intense. Diarrhœa is peculiarly fatal in lambs, especially when first weaned. Some care is requisite to distinguish between a healthy, though perhaps too abundant, discharge, and one that is the effect of disease. When it attains so much violence as to interfere with the animal's strength, and to take him off his feed, it must be regarded as disease, and be instantly checked. The milk of the ewe is naturally aperient; but, in general, diarrhœa is attributable to the quality of the food when the lamb begins to graze. Young succulent grasses are very apt to produce it; and it follows that change of diet is the proper remedy. Dysentery is often attended with inflammation of the bowels, and sometimes with febrile symptoms. Where the animal labours under obvious pain in the abdomen (and the seat of the pain will be easily discovered by its shrinking from the touch), I recommend

* Nor until the dew be off. If a little old hay be also given before they are turned out of the fold, it will in a great degree check the danger during the first few days after they are put upon turnips.—F. Burke.

bleeding. Aperient medicine—and castor-oil is the best in this case—should also be given, but aperients will be mischievous unless the inflammatory character is well defined. In other cases I have given the astringent drink which is described in the Appendix (No. 7). It is often the case that sheep are scoured by the young grasses in the spring of the year. This is not necessarily injurious to them, perhaps the reverse; but in such cases it should be the business of the shepherd, especially in the long-woolled breeds, to shear away the wool on the tail and down the breech. This should be done towards the end of April. Keeping the sheep clean in this way tends to prevent the attack of the fly. I have heard of injections being used in cases of dysentery. I believe them more likely to produce mischief than good: the disease generally, especially in its aggravated form, occasions a secretion of mucus, to an unnatural extent, in a part of the bowels which no injection would reach.* I have much more faith in the astringent drink that I have recommended; and should it not prove efficient, the laudanum may be cautiously increased, but great caution must be observed in the case of lambs.

The Rot is of all the diseases of sheep the most fatal, and perhaps, as respects its proximate cause, the least understood. The disease itself has been well ascertained to be an affection of the liver. Its early symptoms resemble those of a diseased liver in man: the skin, on separating the wool, will be found to have a yellow tinge; the membrane lining the interior of the eyelids, and the gland in the corner of the eye, called the *caruncula lachrymalis,* will have the same hue; and even the flesh, if the sheep is killed in this stage of the disorder, will lose its proper colour, and be pale. Extreme emaciation, attended with dysentery, loss of appetite, and enlargement of the abdomen will be the next symptoms, and generally attended by some degree of cough; cracking of the loins on pressure is distinctly perceived; dropsy follows, and, in the course of seven or eight weeks, or even sooner, death ensues.

Eager and rapid feeding, and occasionally sudden death among the flock, have also been mentioned by a learned writer (Dr. Harrison) among circumstances that should rouse the shepherd's suspicion.

On examination after death the appearance of the lungs is very uncertain, but the liver is invariably found to be the principal seat of the disorder, though all the abdominal viscera are more

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* Injections, composed of warm gruel, with the addition of twenty, thirty, or forty drops of laudanum, would do good, by allaying the pain and great excitement consequent upon this disease, although probably they might not reach the actual seat of it.—T. Spurgin. [Communicated by Lord Braybrooke.]

or less diseased. The liver is generally rotten and completely destroyed. It is found to be filled with a sort of worm, called flukes; and these animals sometimes extend to other parts of the intestines.

These flukes are by some considered the cause of the disease, and it has hence often been called "the fluke." This is clearly an error. The fluke is by some supposed to be generated by the corrupt state of the liver, and rot is often unequivocally developed in animals that have been killed in its early stages without any appearance of flukes. I have also observed that where rot is speedily fatal no flukes have been discovered, though flukes have never been found unaccompanied by other symptoms of decided rot. Such, in few words, are the general incidents of the disorder. But though the symptoms are well known, and the seat of the complaint ascertained with precision, the cause of it remains a matter of much dispute. It differs greatly from hepatic affection in the human subject in the rapidity of its attack. The approach of liver complaint in man is usually gradual, it often being the result of intemperate habits early formed and long indulged; but in sheep the derangement of the organ appears to be affected by indulgence almost momentary. I recollect a case that occurred in Devonshire, where an action was brought by a farmer on the warranty of some sheep that died of the rot very speedily after his purchase. It was proved, however, that though the whole lot died but one, that one which had remained untainted, had wounded its leg on its journey home, and was carried by the farmer in his cart, while the rest were allowed to graze on a common over which they were passing. This was urged and received as conclusive evidence that the sheep were sound at the time of purchase, and became diseased from the accidental pasturage. Other cases very similar have often occurred and been reported in various agricultural works on undoubted testimony. One case, indeed, exactly parallel to that which I have mentioned above, except that it had not the confirmation of evidence in a court of law, has often been quoted. It was first given by Dr. Harrison, on the authority of Mr. Wright, that a tired sheep, taken into the drover's cart while the rest of the drove were feeding on the road-side, and afterwards turned into the same pasture, escaped the rot, while all the others were affected. A relative of mine, Mr. Batten, once exchanged a ram with a neighbouring farmer in Devon, residing about 10 miles from him. The ram he parted with in a few days became diseased in common with all the flock that he served, while that which was received in exchange, and brought back in the same cart, lived many years wholly untainted.

So many are the proofs, that rot is produced by peculiarity of soil, that it is not worth while to quote evidence to this effect; but

the question still remains in what this fatal peculiarity of soil consists. This question is rendered more difficult of solution by the capricious exemption of particular districts from this pestilential disorder. In some of the marshy pastures of Kent, such as the Isle of Sheppey, where the ague is prevalent, the rot is but little known, and generally throughout that county is rarely met with. The same fact may be stated of Romney Marsh and of the Essex marshes, an exemption which may possibly be, in some measure, explained by their proximity to the sea. The South Downs of Sussex are also said never to have been visited by the complaint. But this exemption is not peculiar to large districts; on the same farm some pasturage will rot sheep, while other meadows will produce no mischief. Even in ground that is underdrained, and presumably dry, sheep will be affected, some part of the soil being perhaps light and porous, and hence easily drained, while other parts that are heavy and clayey, though the drains are no farther apart, retain lodgements of wet, from which a pestilential exhalation proceeds. Observation, however, has led to the conclusion that whatever may be the poisonous matter, whether animal or vegetable, the existence of it is immediately consequent on moist or wet weather, especially if followed by warm suns, while dry weather returning prevents the disorder spreading. It has also been noticed that wet pasturage, as such, does not generate the disorder; that sheep have been fed in meadows adjoining to rivers, and in fields with ponds in them, without infection, though constantly exposed to wet; but that, when the process of exhalation begins, these very pastures, though previously innocuous, become capable of exciting the rot.*

It has been stated, on good authority, that the fatality of the climate of Sierra Leone, and perhaps of many other tropical countries, begins at that period of the year when vegetation, having

* My own opinion differs from that of the Author, respecting the cause of rot in sheep, although I am happy to say that we know little of the disease in this part of the kingdom. But I have twice had the rot make its appearance with me, and both times it has occurred when the sheep have been *made* in a field the *whole* of which was wet; for although my sheep have always been allowed to go into the same field, the disease has never attacked them but twice, the first time being the accidental consequence of their being *confined* in this particular field, when fatting, and the whole of them proving to be affected with rot; and the second, when I tried in the following season the experiment of inclosing a few more in the same place, the result of which was the occurrence of the disease in the greater part, but not the whole of them. From these facts, and much consideration of the subject, I have formed the opinion that sheep get the rot in the greater number of cases from the circumstance of being *compelled to lie on wet ground;* for when they have been at liberty to range into other fields adjoining the marshy one referred to, and could thus obtain dry resting-places, although fed chiefly on the wet land, I have never found a single sheep deficient.—W. Greaves.

become luxuriant and rank by excessive rain and extreme solar heat combined, rots away suddenly and exhales a miasma. The form in which disease at this period attacks the human frame is commonly called dysentery and hepatic affection. I have understood, from some who have long resided at Freetown, that the stench of putrid vegetable matter, accumulated even in the streets during the rainy season and immediately after its termination, is offensive to the highest degree. May we not infer that the taint of rot proceeds from the same cause? for though the miasma, in the pasturage I have alluded to, may not be produced in sufficient quantity to affect the human subject, standing upright at a distance from the effluvia, it may be sufficient to affect the animal that in feeding has his nose in constant and close contiguity to the soil. If we are justified in this reasoning, the inferences to which it leads are most important. I do not mean to claim the merit of originality in this view of the subject. It has long been a prevailing opinion that the rot originates in marshy exhalations, but it is desirable to arrive at some conclusion which is at least founded on plausibility, in considering the variety of causes to which rot has been ascribed; and of all the many speculations to which the ingenuity of theorists, or the more homely ideas of practical men have given rise, I think that the theory on which I have dwelt is most consistent with the experience of the farmer. I will, however, admit that there are many sensible men who consider that the disorder is propagated from the qualities of their food, and not from exhalation, as it has been remarked that close feeding is almost essential to the contagion. In the parish of Seaton, in Devonshire, all the sheep that were depastured on the marshes one year were attacked with rot, and died, only excepting four; on examining these four, it was found that they were hog-jawed, and, from the under jaw being very much shorter than the upper, they could not bite near the ground.*

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* It appears in this part of the Essay that many different opinions have arisen respecting the cause of rot in sheep; I therefore beg to state my opinion and experience on the subject in as short and explanatory a way as possible. I would beg to say that I do not think sheep become rotted from *every* kind of wet land whether drained or not, but from a particular character of soil and subsoil: soil of this description is inclined to bog or quagmire, although it may not have that appearance on the surface of the land, but may lie 8 or even 12 feet deep. Between this subterraneous bog and the surface there is generally a hard stratum of blue clay or sand, tainted with the bog-water, lying underneath at that depth; and this infectious water is brought up from the bog to the surface of the earth by means of small pipes which are always found to form the communication between them, and called by experienced land-drainers *bog-pipes*. In consequence of this infectious water thus arising to the surface, a plant is produced—not of the grass-tribe, but called by some old experienced shepherds the

It has often been remarked that, slow as has been the progress of veterinary science generally, there is no branch of it which seems to have made such little advance as the treatment of the diseases of sheep. There is perhaps no disorder of sheep which illustrates this more decidedly than rot: without pretending to discuss this point of pathology, I am however led by many considerations to the conclusion that it may prove a curable disease.

I lately received from a very intelligent farmer at Sanderton, in Bucks, a communication of a fact that confirms my views as to the possibility of cure. Eight years ago he purchased eight score of sheep. After feeding the flock for a few days on turnips, he found that they were all affected with the rot, and 130 died. The greater part of them were examined, and the liver in every case was found to be diseased. The other thirty, having been taken off the turnips and fed on hay, recovered, and at the end

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sheep-rot-weed; and if sheep are allowed to feed on this land, particularly if in a hungry state, although the weed does not grow more than an inch or two above the surface, and is of a nauseous taste, they will, in this state of hunger, indiscriminately eat it up along with the grass, and it will I believe more or less infect them with the rot. When a hole is made in land of this description so as to allow water to collect and stand in it, the surface of the water will in 24 hours become covered with a scum, having the metallic lustre of quicksilver tinged with red, and therefore probably of an injurious nature. There is no doubt that dry land is by far the best for the health and well-being of the sheep, but I know from experience that they are not rotted by feeding on such land as is merely made wet by rain-water, nor by pasturing in irrigated meadows, unless such meadows are irrigated by bog-water.

Having paid great attention for many years to these points, it is my humble opinion that one great cause of sheep's being rotted may be traced to the circumstance of their eating the noxious weed and scum in question, arising from soil contaminated by impure water.

I would beg to observe that a drain laid only to the depth of 2 or 3 feet (the common depth of draining) will not prove effectual, as the bog-pipes arise in a perpendicular direction, and if the drain be not laid to the depth of those pipes, no good effect can be expected, nor can it be said that such land is effectually drained, so that sheep may feed on it with safety.—Note by Mr. Edward May, of East-Hampstead Park, near Bracknell, Berkshire.

The preceding remarks were transmitted at my request, by an individual in whose matured experience on all subjects connected with drainage I can individually place the greatest reliance; and Mr. Dean, a member of our committee, having placed in my hands a small work written in 1651, by Hartlib, the friend of Milton, I have found it to contain not only observations which coincide with those of Mr. May, but further interesting notices of the *sheep-rot-weed* in question; the author of the tract however attributing not only to the noxious plant, but also to the circumstances of the soil and locality, the origin of the rot in sheep in such situations.—Downshire.

The bad effects of a *sheep-rot weed*, or of *bog-water*, are, in my own opinion, very doubtful. The rot in sheep is probably the produce of ground which has been lately wet, and then the surface exposed to the action of the air. The grass and other plants, previously weakened or destroyed by the moisture, become decomposed, or rotten; and, in that decomposition, certain gases, or miasmata, may be developed, that cannot long be breathed, or scarcely breathed at all by the sheep without producing the rot.—W. Youatt.

of two years twenty-nine of them were sent to the butcher, in good condition. He requested that they might be examined when killed, and it appeared that the liver was affected in every case in the usual way. He still possesses the single sheep that was not sold, and she generally produces twins every year, though she has long shown the symptom of rot called *choquered,* or *bottling*—a large glandular swelling under the neck. He has usually lost sheep by the rot every year, and ascribes it to turnip-feeding, or feeding on undrained land, having found it arise from both causes.* He has often found the disorder relieved by change of diet alone; and that his sheep improve in condition shortly after being tainted. As evidence of the effect of turnips in causing the disorder, (probably when covered with a heavy dew or hoar-frost,) he once had five sheep exhibiting symptoms of the complaint, and, removing them from turnips to dry food, they all recovered. In the course of seven weeks he fell ill, and, being confined to his bed, his shepherd again turned these five sheep on the turnips. All of them relapsed, and speedily died, and on examination their livers showed all the usual symptoms of the disease.†

It is also my conviction that the same sanatory process as is used with human patients might, if practised in time, be successfully adopted with sheep. I have already stated that the rot is far more rapid in its attack, and apparently more capricious in its exciting cause than any analogous disorder in man; but I do not, therefore, subscribe to the common opinion that it is an inflammation of the liver. All inflammatory action is attended with pain, and if the inflammation is acute, the pain is severe; but this unequivocal symptom appears to be wanting in the rot. Animals show far more decidedly than human beings the sensitiveness of pain. Pain often produces heaviness, depression of spirits, and what is called anxiety or uneasiness in the expression of the human features; but in the brute creation the effects are different, extreme restlessness, and where the pain is acute, extreme distress and violent motion or struggling being the indications. Now, in sheep affected by the rot, the first symptoms that I have mentioned are always found, the last are wanting; hence I infer that inflammation, at least to any extent, does not exist in the first access of the disorder, and therefore, that bleeding, the usual and most efficacious remedy in inflammatory complaints, would be

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* If sheep have been pastured in low wet land, and have taken the disease while feeding there on turnips, they will incur the complaint, and the animals will be speedily carried off; but no sheep, in my own opinion, were ever rotted by merely feeding on turnips.—J. W. Childers.

† I have not either myself experienced or heard, or read before of the fact of turnips rotting sheep, but I think they are not proper food for sheep when they are already rotted. I think it highly probable that these sheep at Sanderton were rotted *before* the farmer in question had them.—W. Humfrey.

misapplied. The first step that ought to be taken is to remove the sheep if possible to high and dry pasture, and perhaps to more scanty feed, so as to diminish the necessary action of the liver.

I once purchased 12 wethers apparently far advanced in the disease; they were the only survivors of a lot of 70. I bought them on mere speculation at 5*s.* each. I placed them in the stack-yard, and allowed them nothing but beans and hay, with a supply of water, and rock-salt to lick. Three died in the first week, the others recovered.

As a matter of general precaution, the drainage, if possible, of all land liable to rot sheep, will be highly expedient, especially if we may rely on the fact which has been stated by experienced writers on this subject, that May and June are the months in which the contagion is generally found to exist,* and then exactly in proportion to the prevalence of heat after showery weather: but precaution, though better than cure, is not cure. Aperient medicine, and in strong and repeated doses, for a few days, cannot be mischievous. There is no maxim in the medical art so well understood, or so generally admitted, as that the first step towards the restoration of the healthy functions of any organ is to secure a good and regular action of the bowels. Castor oil, or Epsom salts, are the surest and safest of all aperients. It is obvious that discipline of this kind will immediately reduce condition, but I presuppose that the flock is no longer generally in a saleable state, and that the only alternative is a cure or an absolute loss. Having thus secured a proper action of the bowels, I should have free recourse to calomel. I do not think that 4 grains would be too much for a daily dose; and, even at the risk of salivation, I would rather err on the side of excess in the case of rot. It may be borne in mind that, in all cases where drugs are specifics in a disorder, the disorder itself neutralises in a great degree the natural operation of the medicine: thus, in dysentery, laudanum may be exhibited to an extent that would prove fatal to a healthy subject; and, in like manner, a dose of calomel, that would materially affect the salivary glands when there is no counteracting principle, would be innoxious, and even beneficial, when its active properties are brought into direct play on a diseased liver. Some persons have advised the combination of calomel with opium, but I am inclined to doubt whether this may not weaken its action on the system, and produce harm by the astringent qualities of the opium operating on the bowels.

A few doses of salts should be repeated after the calomel has been given, and as soon as the sheep appears convalescent; but not previously, unless signs of salivation show themselves. The

* I should consider the months of September and October as those when contagion is much more prevalent.—J. W. Childers.

patient should be fed on hay or clover-chaff, sprinkled with common salt; and, for some weeks after recovery, the character of its food should be attentively regulated, avoiding all succulent vegetables as much as possible until health is completely restored.

It may not be improper to mention other remedies that have been quoted as beneficial. In the Agricultural Report of the county of Stafford, a table-spoonful of spirits of turpentine mixed with two of water, twice administered, after an interval of 3 days, is said to have cured 5 out of 6 rotten sheep. Salt, to the extent of a table-spoonful, has also been given with useful effect; and it is a matter of acknowledged experience, that the sheep fed on salt marshes are not liable to the complaint. I am also bound to admit that the use of mercury has been deprecated by some writers, who assert that, in herbivorous animals, mercury has not the same specific action that it has in the human subject. It is well known, however, that in horses calomel is often administered with decided benefit in hepatic affections; but I think it right to mention the variety of opinion that exists on such an important topic. I have known the recipe, which I quote in the Appendix (No. 6), administered with very salutary effects.

I may here notice another precautionary measure, which is I believe rarely taken,—to avoid turning the sheep out of the fold while the dew is on the ground. Dewy vapours are well known to be injurious to the animal in feeding.*

Dropsy, or Water-sickness, is a disease very generally known to shepherds. It seems to proceed from constitutional debility rather than from any accidental cause, though it is most frequently met with where the pastures are bleak. Aged sheep are most liable to it. Its symptoms are all of the dropsical kind. Swellings appear and change their seat without apparent cause; the sheep becomes dull and languid, and, ultimately, the belly is distended with water, and the motion of it can be perceptibly felt against the hand. I can recommend no other treatment than a substitution of hay, of the best quality, cut into chaff, for all moist food; and to this may be added oatmeal-gruel: the sheep being carefully housed, and the bowels kept open. A decoction of oak-bark has been favourably spoken of; but though, in all dropsical affections tonics seem to be the natural remedy, I cannot from my own experience testify to their success in this case. Tapping will produce no permanent effect; the water will rapidly accumulate again, unless the seat of the disorder is attended to.

Redwater, or Resp, is sometimes confounded with bloody

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* I prefer my lambs to have their food early during the summer months; the Hampshire farmers turn their lambs out as early as three, four, and five o'clock in the morning; and they make a higher price of their store lambs early in the season than the farmers of any other county in England. —W. Humfrey.

urine: it is a different complaint. The urine may be tinged with blood from inflammation of the kidneys or bladder; and in such cases the inflammatory symptoms must be subdued, as in all other instances of acute inward inflammation, by bleeding copiously and exhibiting purgatives: but redwater is an inflammation of the abdomen, or of the membrane that lines the abdominal cavity, and the redwater is found in that cavity.

Some persons treat this complaint as inflammation of the kidney. It is extremely probable that, in all cases of redwater, the inflammation of the abdomen may extend to the region of the kidney, and thus some of the indications that appear may lead the observer to suppose that the kidney is the primary part affected: but my opinion, founded on post-mortem examination of the subject, is, that the inflammatory action has its origin in the peritoneum, and, consequently, that change of diet and attention to the bowels are the first points to which the care of the shepherd should be directed. If this opinion is well founded, diuretic medicines are not judicious.

Feeding on turnips when covered with hoar-frost is supposed to occasion the complaint. Another, yet more probable, cause may be folding sheep on wet soil during frosty nights. The progress of this disease, as indeed is the case with all acute inflammation, is very rapid; so rapid as to occasion death in most instances before the existence of it is suspected. Where its progress allows of observation, the indications of it are costiveness of the bowels and great pain and distress; the animal appearing incapable either of rest or active motion from the violence of its sufferings. Its name is derived from an accumulation of bloody fluid in the abdomen. The remedy is, as I have already mentioned, copious bleeding, even until fainting takes place, and this followed by opening medicine: but it is so rarely the case that a cure can be expected, that, if the sure symptoms of it are perceived, the best way is to kill the sheep before they have obtained their height. Where I have succeeded in removing the inflammatory symptoms, I have immediately changed the food, and put the sheep on bran and oats, very liberally sprinkled with salt. I also provide water very copiously.*

* This disease is very prevalent in this part of Derbyshire, and a friend of mine, Mr. Cooper of Ashford, for many years lost one-fifth of his hoggets from redwater. Three or four years ago he was advised to bring them into a yard, and give each hogget a table-spoonful of common tar every fortnight, and the consequence has been, that, although they are kept in every respect in the same way as before, and on the same ground, he has not lost one sheep since the adoption of this treatment.—It will be thought tar is my common recipe for all diseases, when I state, that two table-spoonfuls given every fortnight to year-old calves has been found a great specific against

Redwater has sometimes been called "WATERY BRAXY," but I apprehend that the braxy is more properly a retention of urine, proceeding from inflammation of the bladder, as the dry braxy is another name often applied to inflammation of the bowels. I never met with a case where a ewe laboured under retention of urine. When it occurs it most frequently attacks rams, and many valuable sheep have been lost from its effects. I have remarked it to have been generated by placing them on clover that had previously been mown. As it may be easily detected by the distension and tenderness of that part of the body externally, the water can be successfully drawn off by a catheter. It may not be unnecessary to caution the shepherd that diuretic medicines are most injurious in a retention of urine, as they increase the secretion of the fluid without in any way facilitating the discharge.

BLACKWATER is another complaint occasionally observed in sheep, and is indicated by the discharge of a black and sometimes bloody serum from the kidneys. After death, a fluid of the same description is found in the stomach. Rank pasturage is believed to be the cause, and, of course, change of pasturage most likely to prove a cure. The bowels should be kept open, and tonics, such as bark or steel, exhibited. A tea-spoonful of vitriolic acid in an infusion of oak-bark is a convenient compound.

Sheep are not very susceptible of vegetable POISON; but the foliage of the yew-tree is fatal to them, and perhaps some other plants with which I am not acquainted. Generally speaking, sheep will refuse food of a deleterious character, but lambs are more careless, or their instinct is less powerful. Where there is reason to apprehend the presence of poison, the injection of warm water by the stomach-pump, until vomiting is produced, appears the only efficient or practicable remedy.

I must not dismiss this part of my subject without adding a word or two on INFLAMMATION generally. In most of the disorders that I have enumerated, inflammation is one of their symptoms; but an inflammatory affection often appears, though without a local determination of it to any organ or part so as to enable us to fix the seat of the disease. In such cases it is usually known as fever, and is indicated by general heat, throbbing, and loss of appetite. It is difficult to lay down rules for its treatment when thus extended through the system, but the safest principle is to bleed copiously from the neck, give aperient medicine to such an extent as to keep the bowels well open, and drench the sheep with cooling drinks, and

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the Murrain (or, as we call it, the Speed). Mr. Cooper rears a few every year, and three years ago lost three-fourths of them, but he has not lost any since he used the tar.—W. GREAVES.

warm mashes or thin gruel. In every case where much pain is evinced on touching the belly, the flanks, or any other particular place, fomentations may be beneficially applied; but all fomenting must be patiently persevered in for an hour together, or even more, if it is designed to be effective. Inflammation is an unnaturally increased circulation of the blood and a consequent distension of the vessels. Where the part affected can be distinguished, and lies externally or superficially, fomentation produces local relief by removing that tenseness of the integuments which excessive circulation produces; but, in other cases, the excess of blood must be removed by depletion, and its renewed accumulation be prevented, if possible, by aperients and low living. Being in the latter case usually accompanied by extreme thirst, drenches and gruel remove this unpleasant sensation, while they afford nourishment without enriching the blood.*

Cough, or Cold, will sometimes affect sheep severely. Its symptoms resemble those in man, and are removed by very similar treatment; but in an aggravated form it must be decidedly controlled, or it will terminate in consumption. If inflammation shows itself decidedly about the throat and larynx, attended by a violent discharge from the nose, it will be prudent to bleed the sheep freely from the neck, and, by the aid of warm mashes and removal to a sheltered spot, the symptoms will

* I have one general fault to find with the Author's treatment, namely, in the case of bleeding. In my own experience, I have suffered much from bleeding horses and cattle; and sheep would, I have no doubt, be injured in the same degree. There is often so much apparent inflammation from debility, when bleeding would be fatal, that I think he too indiscriminately recommends the depletion of the system, and I perceive advises it under most of his heads. In epidemics generally, unless active inflammation exists, I never bleed; and I may mention, in illustration of the principle of my practice, the following striking instance in reference to this point. Three years ago, when there was a disorder among coach-horses, I had forty ill in ten days. One of them was bled, namely, the first that was taken, and the only one that died; for, although by the bleeding the disorder appeared to be removed, so general a weakness ensued in the case of this horse, that dropsy was the result. Having paid much serious attention to the nature of the complaint, and feeling confident in my own mind that much of the apparent inflammation arose from general debility of the whole system—an opinion in which I am confirmed by knowing several people whose horses had been attacked before my own, and their stock sacrificed to a considerable amount by injudicious bleeding—I took the other way, and gave each of the horses, as they became severally affected, a quart of good ale, with ginger and other spices, and two quarts of oatmeal gruel: the consequence was, that there was not a single horse that did not recover under this mode of treatment; and, I may add, that although I generally keep about a hundred horses, I have not allowed one of them to be bled for the last two years, and since the discontinuance of bleeding I have not had half the number of cases of swelled legs and grease I previously had. —W. Greaves.

shortly disappear. Epsom salts, to the extent of two ounces, may be usefully given; and, when the sheep recovers, it should be housed during the continuance of severe weather. The first week of spring will cure every patient without further trouble.

CONSUMPTION is a more common disorder among sheep than is generally supposed: the animal being usually killed as soon as a wasting of the condition becomes apparent, consumption has scarcely time to assume its peculiar and decided character. The lungs of the sheep, however, are rarely found quite free from disease. This may be ascribed to various causes. While the cough is only in an incipient stage the animal does not lose condition or appetite, and consequently the animal is disregarded until disease has made considerable progress. His exposure to wet and cold continues; he is shorn with the rest of the flock, without regard to weather or to his peculiar infirmity of cough; and thus the symptoms are daily aggravated, when, by a little prudential management in the beginning, he might possibly have been cured. At length, if his gradual decline renders it expedient to destroy him, he is killed before the real nature of the complaint is discovered. Attention should be given to every case of cough as soon as it shows itself; and the best precaution is at once to remove the sheep to a sheltered situation.

The FOOT-ROT is a complaint which I am well assured has by the generality of writers on the subject been treated of much more from theoretical knowledge than practical experience; for, although the symptoms and remedies appear plausible and read well, yet a short trial of the latter will soon prove their absurdity. It is a disease with which I am intimately acquainted, having for six years superintended a flock in a county where it was very prevalent, and I have cured thousands. The disease generally commences with a soreness between the claws attended with slight inflammation, which quickly insinuates itself beneath the horny part of the hoof. The crust becomes gradually detached as the ulcerous sores extend, and, finally, the hoof itself is lost.

It is most prevalent in the fall of the year, and, as this form of the complaint is found to affect many of a flock at the same time, it is generally considered to be highly contagious: but there is no sufficient evidence of this, and my experience is opposed to the doctrine.* For instance, when residing in Cambridgeshire I was in

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* Does the author draw the proper distinction between "foot-rot" and "sore feet?" I can scarcely conceive a more dangerous error than the belief that foot-rot is not infectious. If it were acted upon it would more than decimate our flocks in the course of a very few years.—W. YOUATT.

In differing from such an authority as Mr. Youatt I may be considered presumptuous, yet, feeling convinced by my own experience that I am right, I still maintain that "foot-rot" is not very infectious. The sheep alluded to

the habit of purchasing ewes from a distant county, and generally on their arrival found several affected with the foot-rot. They were allowed to run with the other sheep, but the disease did not spread to any extent, seldom above three or four of the flock being slightly affected besides the new comers, and in a short time by attention

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were purchased in Devonshire, and from a flock seldom or ever free from the complaint. They were sent to London in a steam-packet, and some of the lame ones conveyed from thence in a cart. It is therefore clear it could not be "sore feet" occasioned by travelling. I have often found both fore feet much diseased, and the hind feet perfectly sound; this, to me, appears a proof of my assertion. The disease prevails most in small woody enclosures where the land is of a rich quality, and is very troublesome in the autumn. I consider that one of its chief causes originates from the dew remaining on the rank pasturage, under the hedges, whilst the centre of the field is free from it; the feet of the sheep in consequence are alternately wet and dry. These frequent transitions tend to harden the hoof, or *vice versâ*, and end in producing a soreness between the claws, which, if not immediately attended to, ulcerated, corroding the hoof, &c. &c.—The Author.

I have never heard a doubt expressed by any farmer with whom I have conversed on the subject, of the foot-rot being contagious.—F. Burke.

"There is much doubt whether the foot-rot is contagious; it may in some degree be so, by inoculation, when the disorder is at the worst, and a discharge of the acrid matter is left on the ground. The writer had the care of 700 ewes in the year 1829, and found that the flock suddenly fell lame, in the autumn of that year, from foot-rot; no cause could be assigned for such an occurrence: after considerable time a cure was effected, and it did not again appear until the autumn of 1839, a space of ten years, when it a second time broke out, and, in the course of a few days after the disorder had re-visited the flock, nearly half of the sheep were affected. I should, therefore, suppose the cause to be one and the same, although a part of the flock in the first instance escaped its ravages. It is highly desirable, in order to effect a quick and certain cure, to dress the whole of the flock, whether lameness has shown itself or not, as the disease takes place several days before the lameness becomes visible; and by dressing the sheep in this early state of the disorder the cure will be greatly facilitated. I have never found a cure so soon produced as by using butyr of antimony, after paring the foot in the usual way, care being taken to put the antimony between the claw of the foot with a feather."

These remarks were written by John Rusbridger, Esq., my Agent in Sussex, and who for many years has had the superintendence of my Southdown flocks in that county. The autumns of 1829 and 1839 were both very wet.—Richmond.

I unfortunately had a good deal of foot-rot some years ago, and am decidedly of opinion that it is infectious, and I think the more so on good pasturage than on poor, unless great attention be paid to the sheep's feet being regularly pared; and I do think that Mr. Cleeve has not by any means laid the proper stress on the requisite paring of the flock's feet; for in good pasturage, where the sheep has to ramble very little for his food, his feet are more liable to grow and form pockets over the sole, so that the matter left by the diseased foot is the more liable to be taken up and retained; whereas, on a poor pasture, the animal is more on his legs, and consequently the wear is equal to the growth of the horn, and the flock far less liable to have the foot-rot communicated to them. I remained free from this dreadful disease

it was easily eradicated. It seems, therefore, more probable that it arises from some peculiar cause connected with the nature of the soil and situation to which all the diseased sheep are equally exposed. It is very possible that, where a discharge of acrid matter is left on the ground, other sheep may become affected, or perhaps inoculated, by treading on it, as no doubt was the case in the few instances I have recorded; but the rapid extension of the disease which I have often witnessed must arise from some other source. The cure is easily accomplished by an experienced person. The lame sheep being separated from the rest of the flock, the hoof must be cut away with a sharp knife (called a sheep-foot knife, by cutlers) as far as the disease has spread, and which may be traced by its becoming divided from the internal parts; this must be particularly attended to, for unless the sore is probed to the bottom no application will be of service. When this is done the ointment (Appendix, No. 5), will often prove effectual at one application. It is wrong to use too strong a caustic, as it dries up the surface too quickly, and matter forms beneath.

Another form of this complaint, and known also by the names of *foot-halt, lore,* &c., and much more difficult of cure, generally proceeds from a strain or blow. It commences with a visible enlargement of the foot, accompanied with great inflammatory action. This continues to increase until suppuration takes place, when matter is discharged from between the claws and just above the coronet.

In treating foot-rot of this character, the same course which I have recommended in the preceding disease designated by the same name will not be successful. The most judicious treatment is to promote suppuration as quickly as possible. For this purpose, I have found nothing so effectual, after well fomenting the parts with warm water, as an application of Venice turpentine on some tow, which must be confined to the foot by means of a stout rag. It should be examined three times a-week, the fomenting process renewed, and a fresh plaster applied. Should any fungus excrescence appear, it must be removed by caustic. When there ceases to be a discharge of matter, the plasters may be discontinued, and the foot will soon become sound.

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for two years, till the autumn of 1839, when having bought some sheep which unfortunately broke out with it, it spread through most of my flock. I have now only some six or seven left lame, and they are fast recovering. My plan of treatment has been very simple: I strew the floor of a large shed all over with quick-lime, and put the sheep in every morning for about a quarter of an hour, and in the afternoon dress the foot alternately with butyr of antimony, and finely-powdered blue vitriol; and I have generally found them recover after a few dressings. In wet weather, it will be found very beneficial to wash the diseased feet with strong lime water.—W. Greaves.

There is in the foot of the sheep a small aperture called the biflex canal, placed just above the division of the pastern. It secretes a mucous fluid for the protection of the joint, and as this secretion is sometimes perhaps by a little inflammatory action carried to excess—whether it is of an acrid character or not I cannot say—it has a tendency to produce ulceration of the surrounding parts that occasionally proceeds to mischievous extent. This complaint is very different from the foot-rot, although generally classed with it, as the foot itself remains perfectly sound, the ulcers being confined to the parts above the hoof. Strong caustic applications are frequently all that are necessary towards effecting a cure. The ointment recommended for the foot-rot is very serviceable, as also butyr (or, as it is commonly called, butter) of antimony.* I have sometimes found it necessary to poultice the sores; for this purpose one of linseed-meal is a good application.

Thorns when allowed to remain in the foot will cause matter to form and produce considerable inflammation. The hoof must be pared away to allow a free discharge, and a plaster of Venice turpentine applied as recommended for foot-rot.

Wounds in sheep are not very frequent, unless from the bite of dogs, or lacerations or punctures of the legs. Where the wound arises from a blow, a fracture of the limb often follows. In this case the bone must be carefully replaced, so that the two ends at the point of separation may be carefully set in their natural position; and they must be retained in that position by splints and bandaging for about a fortnight. If the fractured bone protrudes through the skin, the superficial wound must be enlarged by the knife so as to restore the bone to its proper place, and splints must be applied as in a simple fracture; but the cure in this case is likely to be so tedious as to make it more expedient to kill the sheep at once. Should the bandage occasion a swelling of the limb before it is safe to remove it, it may be eased by dividing it at the edges with a pair of scissors, without untying it. All simple wounds are to be treated in the same way as in the human subject, and Nature has given to animals a facility of healing which is too often denied to man. If the wound is extensive, a suture should be applied, always being careful to bring the opposite lips as closely together as possible, and having previously washed

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* The butyr, or chloride of antimony, a sufficiently powerful superficial caustic, and, except inordinately used, being incapable, from its peculiar affinities, of producing any deeply-seated mischief, is beyond all comparison the best general application for foot-rot.—W. Youatt.

I have found the ointment equal, if not superior, to the Butyr of Antimony, from an extensive practical trial of both, and a box of ointment is infinitely preferable to carry in one's pocket to a phial bottle of caustic.—The Author.

away all dirt, splinters, or foreign substances with a sponge and warm water. Where the wound is not extensive, a simple bandage of old linen, carefully and rather tightly wrapped round the limb, will make the incision heal by the first intention. Should the injury be occasioned by a splinter or thorn it must of course be carefully extracted before the wound is closed, and, if any contusion has attended the accident, bran poultices will form the most useful applications. In the case of simple cuts, tincture of myrrh or friar's balsam will stay the effusion of blood and promote the healing, and, what is of great consequence in warm weather, keep the flies from irritating the wound; but, should any considerable vessel be opened, it will be necessary to take it up by passing a thread underneath it, and tying it tightly. The ligature should generally be made of waxed silk. It may occur that a small artery is lacerated, and in some place where it is difficult to pass a ligature round it; in such cases, if the artery (provided it is not large) is fairly and completely divided by a penknife, or lancet, the wounded extremities will generally retract by their muscular action, and, being covered and pressed by the surrounding integuments, the blood will soon cease to flow.

This seems a proper place for explaining, for the benefit of such of my readers as are as deficient in scientific knowledge as myself, the ordinary stages in the sanatory progress of wounds. Where they are produced by a clean and simple cut, without contusion, they will heal by the first intention, as surgeons technically call it; that is, the separated parts will unite by inflammatory action, if the sides of the wound are drawn together either by stitches or by adhesive plaster. If, however, either by contusion or by other causes, a considerable portion of the integument happens to be destroyed, the inflammatory action, which is always the first and immediate effect of a wound, will produce a sore of greater or less extent and depth in proportion to the injury that has occurred. This sore suppurates or discharges a fluid matter At first this matter is acrid and thin, of a light whitish colour, and sometimes having a greenish tinge; but, if the sore progresses favourably, the fluid becomes more yellow and thicker. It is followed by granulations, or little risings of flesh of a bright red, the edges of the sore are perceptibly diminished, and the florid granulations fill up the space left by the destruction of the integuments, the centre of the sore being always the last to heal. It often happens, however, that either from a sickly constitution, or from the accidental introduction of dirt or foreign substances at the time the wound was received, the healing process is interrupted. Sometimes the granulations have a livid instead of a florid hue, and appear puffy, such as is commonly known by the name of *proud-flesh.* In such cases a gentle application of caustic will remove the fungus cha-

racter, and restore the proper secretion of healthy matter. In other instances the sore deepens instead of becoming daily more shallow. This proceeds either from the deposit of some latent splinter, or dirt, in which case poultices are beneficial to promote the discharge of the foreign matter, or it is occasioned by the acrid character of the fluid corroding the adjoining parts. Poultices are useful in this case also; but, if deep sinuses are formed, they will probably require to be laid open with the knife. Wherever a sore assumes this fistulous appearance, it indicates a necessity for sustaining the general system by bark and tonics. It may also be laid down as a general maxim, that, whenever the inflammation becomes violent and extensive, it should be promptly checked by fomentations and poultices, and, if a vital part is menaced, by the free use of local bleeding. This simple explanation, concise as it necessarily is, will materially assist in forming a judgment whether our four-footed patients are progressing favourably to a cure, or whether their case is hopeless and not worth the expense and trouble of further attention.

The Scab, or the Rubbers, is a complaint so well known to every breeder, by its mischievous effects and highly contagious character, that it seems scarcely necessary to describe it at any length. It originates, like some other cutaneous complaints, in the propagation of vermin in the skin. In its commencement the cuticle appears unnaturally red and florid. This is followed by a pustular eruption, accompanied by extreme itching. The confluence of the pustules, when breaking, occasions an extensive sore, and this is soon covered by the scab: but the healing process does not proceed, for the itching causes the sheep to rub himself against the posts and rails until the scab is removed, and the sore is made worse by exposure. At length the animal dies of exhaustion; about a fortnight occurring between the first infection and the pustular eruption.

Although fat sheep, or those in improving condition, seem less liable to be attacked with scab than others, it is not, as some have supposed, a disorder in the blood, and to be cured by change to richer pasturage: it is strictly a cutaneous and local disease, although, like other local complaints, it will seriously and even fatally injure the constitution if not checked in its early stages. If speedily discovered sulphur ointment will prove a remedy, but in more serious cases in order to effect a cure it is necessary to dress the sheep with the mercurial ointment given in the Appendix (No. 1), which operation is performed according to the following directions:—Divide the wool in two parallel lines, about two and four inches from the back on both sides, and also one line down the shoulders and thighs; lay on the ointment close to the skin with your forefinger as you make the divisions; lay another

furrow or line down the throat, under the belly, and between the fore and hind legs; at the same time examine carefully for the affected parts, and dress them.

Three pounds of the ointment are sufficient for a score of large sheep, and two pounds and a half for hoggets or sheep in low condition.*

Highly useful as this preparation is for the cure of so troublesome a complaint, and much as it is recommended, yet there is scarcely a farmer that has used it without the loss of sheep from its injudicious application. October and March are the proper months for dressing when the weather is dry; nor should it be delayed to a later season. In hot weather the absorbent vessels carry it too quickly into the system, and the sheep become salivated, and also in the winter, from lying on the cold and wet ground. I was once persuaded by a veterinary surgeon to dress 300 lambs in August: although I was very careful in not applying more than 2 lbs. of the ointment per score, yet, for two months, I had to regret my folly, having, in that time, lost 62. I mentioned this to a cattle-dealer at Cambridge, who said I must have laid it on too strong, for that he had just dressed 50, and saw no fear of his; but when I met him about a fortnight after, the tale was altered, and 15 had died. Instances of losses from applying the ointment in the winter months are too common to need any caution from me. It is highly dangerous to use it on ewes before or after lambing, nor is it safe at any time to anoint sheep that are poor or weak; but the following infusion will answer the purpose when it is improper to use the mercurial ointment:—

Boil half-a-pound of tobacco in two gallons of water until reduced to one; strain and then add half-a-pint of spirit of turpentine, and half a pound of flowers of sulphur: on the application of this mixture the scabs should be broken, and every affected part well searched and dressed. As this decoction, as well as the ointment, stains the wool and disfigures the sheep immediately after they are shorn, I generally use the lotion (Appendix

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* I have found, in my own experience, half the quantity to be sufficient.—J. W. Childers.

We have many remedies for the scab (or shab), which by great care and unremitting attention will cure it. Of late, in the neighbourhood of Newbury, a new remedy has been introduced for it by a person who travels from farm to farm dipping sheep for the ticks. He applies other ingredients with his mixture, and dips them the same as for the ticks, which is a great saving of time and expense, and much better for the sheep than the plan of continually catching them to dress them; and if it should succeed in future, as I understand it has already done, it is likely to supersede every other remedy.—W. Humfrey.

The chief ingredient in this remedy is probably corrosive sublimate.—The Author.

No. 2), first washing the animal well with soft soap and warm water.

I also recommend the use of aperients, as also bleeding from the eye-vein in sheep much diseased. Two ounces of Epsom salts would be a sufficient dose; and in administering medicines internally some care is necessary to insure their reaching the stomach. They must be swallowed slowly, not forced down, otherwise they will be precipitated with such force as to open the paunch in their descent, and will remain there instead of entering the stomach and bowels; for the structure of the parts is such as to admit of this misdirection of the medicine. A six-ounce phial is a convenient instrument for the gradual introduction of fluid medicine.

To return from this digression. Every infected sheep should be removed from the flock as soon as dressed, and until there is a satisfactory proof of its convalescence. Even here, however, the anxiety of the farmer is not at an end. The complaint is probably more contagious than any other that can be mentioned. It has often happened that, after all the stock has been sold and replaced, the new comers have been speedily infected. This is occasioned by coming in contact with the fences against which the diseased sheep have been in the habit of rubbing themselves; the wool left on the posts retaining some of the eggs or larvæ of the vermin, and of course communicating them to the new flock. The prudent farmer should therefore cause all flakes of wool remaining on the hedges to be carefully collected by his boys, and he should also remove all useless posts, and paint or tar the gates, or wash them with a solution of the chloride of lime, before he uses the same pastures again.

Some complaints have been erroneously confounded with the scab, and much inconvenience and even mischief has arisen from the mistake, all the usual remedies to avoid contagion being taken unnecessarily. Hard and scurfy eruptions, and some species of the ticks, have been considered to be scab, and treated accordingly. The shepherd will be guided in his judgment by the actions of the sheep; if he observes that the painful itching and incessant rubbing are wanting, he may safely conclude that the attack is not scabby in its character. In some parts of the country the scab in its most virulent form is known by the name of "Wildfire." It becomes a species of erysipelas.

PELT-ROT may be here mentioned, less as a specific disorder, than as a frequent effect of scabby eruptions. It consists of a spontaneous falling off of the wool. It is sometimes produced by febrile attacks, as often happens with the human being after severe fever. In other cases I have known it to be constitutional, returning at regular periods, and most usually once a-year. Ewes suckling twins seem to be very liable to it, probably from the poverty of

condition, brought on by too much nursing. When the shepherd perceives one of the flock losing its fleece he ought, by immediate shearing, to save the wool, and, if the skin appears scurfy, it should be anointed with lard, or linseed or other oils. If the weather is severe at the time of this premature shearing, the animal should be clothed in a coarse canvas jacket lined with flannel.*

THE FLY.—Sheep are most liable to be struck by this insect in the months of August and September, but it is a very prevalent complaint during the continuance of hot showery weather. It is caused by a large species of fly, which select the wool of the sheep for their nest, and generally settle underneath the tail. Inattention to cleanliness, by allowing the dung to accumulate on the part, is one of the chief causes. The sheep betrays its uneasiness by refusing to feed, and by various contortions of the body in its endeavours to rid itself of its troublesome parasites, which a little experience will easily detect. Too much attention cannot be bestowed on the flock by the shepherd to discover the affected sheep, for, although the discolouration of their wool, and the uneasiness which the animal manifests on most occasions, might seem enough to attract attention from the most superficial examination, I am persuaded, by experience, that, without the strictest scrutiny, many of the flies will be passed over, the coat become injured, and not unfrequently the sheep destroyed, before it has been discovered that it is seriously ill. To guard against this, the flock should be counted *twice* a-day, for often when a sheep is struck it will run into the shade of a deep ditch for protection, and there remain undiscovered. The flock should be separately examined, one by one, before the flies are busy; and, during the day, it should be carefully noticed whether flies are inclined to settle on any particular sheep; and if so, on close inspection of that sheep, it will be found that there are fly-blows or maggots, even though the animal at the time seems insensible of it.

The best application for the destruction of the maggot is the scab-ointment given in the Appendix (No. 1), especially if the skin be much broken, as it assists to heal the wounds and keeps the skin from cracking. The ointment must be laid on and a little beyond the affected parts, separating the wool in furrows, and closely applying it to the skin; after this is done the wool should be carefully brushed backwards and forwards with the fingers, when the maggots will very soon roll out. The sheep should be

* If thus dressed, should not the jacket be rendered impervious to wet, either by the outer covering being made of water-proof material, or by smearing it with pitch? for the rain will otherwise penetrate through it to the flannel, which will retain the moisture, and thus keep the animal constantly damp and cold.—F. BURKE.

examined again in a few hours, and if any have been overlooked in the first operation they will now be found in small clusters, when another application of the ointment will generally be sufficient to remove them altogether.

In cases where the sores are so numerous and extensive that the ointment cannot be prudently used in adequate quantities, the wool being closely removed, the parts should be bathed with milk, a small quantity of white-lead scraped on, and then linseed-oil applied with a soft brush. This treatment should be repeated daily until the cure is completed; a covering being provided for the animal to protect it from flies.

If a lotion is preferred, the one found in the Appendix (No. 2) is equally efficacious for destroying the maggot, but it is a harsh remedy and injurious to the wool.

In order to prevent the fly from blowing in the wool, it is a common practice in the west of England, about a month after shearing, to smear the sheep over the back and round the tail with a composition of sulphur and hellebore; given in the Appendix (No. 3).*

There is another complaint, commonly called Sore-heads, which is also caused by the fly, but a smaller and distinct species from the preceding, and is most troublesome in woody enclosed districts. The flies settle on the head of the sheep, which causes them to strike at it with their hind feet; hence the skin becomes wounded, when the insects, settling on the abrasure, quickly extend and deepen the sore, and annoy the animals to such a degree, as to prevent them from feeding whilst their tormentors are on the wing.

I have tried various remedies, but found nothing better than the grease on the axle-trees of carts, called cart-gum—a composition of tar, grease, and oil. Spirit of tar is also an excellent application, from its smell being offensive to the fly.

In order to apply the dressings the flock should be had into the fold (if not already there) early in the morning, and, as their

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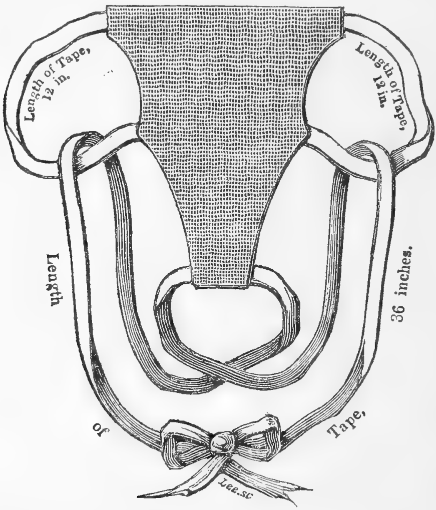
* I have tried several remedies, and all of them have destroyed the maggots. It is injurious to the flock to be driving them about to catch those affected by the maggot, when the weather is warm. The best mode of proceeding that has come within my own experience is to dress the lambs with the powder, when the fly appears early in the spring, and to have them dipped for the ticks early in the autumn, which prevents the fly from attacking them late in the season. There is danger in dipping lambs early in the season, when young and tender, and I have found by experience that when dipped very early, they have been struck with the fly late in the season; therefore, the application of the powder (which is an excellent remedy to prevent the fly from striking, and in which there is no danger to the young lambs), and dipping them early in the autumn, is a safer course in the eradication both of maggots and ticks.—W. Humfrey.

heads are dressed, let them out, or they will rub it off against each other. Capping them is the best system (when they have been allowed to get very bad), not by sticking the caps on the head by means of pitch or any adhesive mixture, which, from its irritating the wound, they soon kick off, but made according to the following pattern. Under this, and over the sore, to prevent the canvass from drawing it, apply a piece of white sticking-plaster; and, let the head be in ever so bad a state, this will effectually cure it without any further trouble.



The wide part of the cap must be placed on the top of the head, and the ears brought through the loops: the strings at the bottom of the cap are to be first crossed beneath the lower jaw, and then passed through each loop on the opposite side, brought down, and tied under the throat.

The Ticks are a kind of lice, frequently producing a scabby eruption on the skin, that not only occasions considerable annoyance to the sheep, but, like the disease commonly known as the Scab, injures the fleece very materially. Mercurial ointment will soon remove the intruders, or, if the warmth of the season renders it dangerous to incur the risk of salivation, tobacco-water will have the same effect; the tinge, however, that this gives to the wool makes it a less convenient remedy if the mercurial ointment can be safely applied. The lotion, No. 2, would be better than either of these.

The remedy used by Mr. Coke (now Lord Leicester) is tobacco, soft soap, and white calx of mercury, in the proportion

of 2 and $2\frac{1}{2}$ of the first two, and 1 lb. of mercury, to 8 gallons of water. This will dress three score of sheep.*

When very numerous in lambs, as is often the case a short time after they are weaned, an excellent remedy is to dip them according to directions given in the Appendix (No. 4). This will not only eradicate the tick but materially improve their appearance, and, in a great measure, prevents the fly from depositing their larvæ in the wool.†

These are all the cutaneous diseases to which sheep are usually liable. There may be others found in parts of the country with which I am not familiar, and perhaps varieties even of those that I have mentioned may appear under forms so different as to render their identity questionable. But in all cases of eruption, and especially if several of the flock are simultaneously affected, the diseased sheep should be separated from the others, and mild mercurial ointment applied, or, where circumstances do not admit of its safe application, tobacco-water may be used as a substitute.

There are many other disorders of occasional, and, in some places, of frequent occurrence, more particularly those of a febrile character; but the above are more or less common in all flocks, and it would make my treatise too long for any useful purpose if I were to introduce all that has been written or reported upon every disorder of which experience has proved the sheep to be susceptible: some, even of those that I have mentioned, occur too rarely to make any lengthened observation on them desirable.

After thus enumerating, at greater length than I at first in-

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* An application having been made, by direction of the Duke of Richmond, for the purpose of obtaining correct information respecting the present mode adopted at Holkham, the Earl of Leicester has communicated to the Society the following authentic document:—

Recipe for Dressing Sheep to Destroy Ticks, &c.

$1\frac{1}{2}$ oz. white arsenic to 1 gallon of water.
3 oz. of soap to ditto.
2 oz. of tobacco to ditto.

The arsenic must be boiled in a bag, and kept stirred at the time of boiling. The tobacco to be boiled in a bag, and put into the water when cold. The soap to be cut into thin slices; and boil the whole of the mixture well for half an hour.

One pint and a half of this water to be applied to one sheep.

Leonard Loose, Shepherd, Holkham.

17th Jan. 1840.

† It is better to dip the lambs immediately after the ewes are shorn than after weaning. The shearing the ewes destroys or removes the ticks which were upon them, and the dipping destroys those which were upon the lambs; whereas, if it is postponed till the lambs are weaned, the wool on the ewes will have then grown long enough to shelter ticks which have come upon them from the lambs after the time of shearing.—Spencer.

tended, the ordinary diseases of sheep, I will beg the attention of the sheep-master to some precautionary rules, which, at first sight, may appear commonplace, but which, experience daily tells us, are too much forgotten in practice. The object of the farmer ought to be to grow as many sheep on his farm as is consistent with the feed it supplies, and if he exceeds or falls short of this just proportion he will either way be a loser. This is too obvious to require much illustration. In the former case the sheep are starved, and will neither do justice to the land nor pay when sold to the butcher: in the latter much valuable food is wasted, and his profits, as a matter of course, diminished. Another point of consideration is the sudden change of food to which some subject their flocks. The majority of the diseases that I have mentioned in the preceding pages proceed from a sudden change from a scanty to a luxurious diet. It is no uncommon occurrence to see a flock, which has been nearly starved during the winter, suddenly turned into abundant pasturage on the approach of spring; or others, which during summer and autumn have received little attention, and been hardly folded, abruptly put into coleseed or turnips. Diseases arising from indigestion and repletion soon follow, and the farmer is astonished at the extent and rapidity of his losses. All this might have been avoided by making the transition a little more gradual. At night the sheep should be removed from their new feed, good sweet hay should for a time form a considerable portion of their diet, and, by slow degrees, the flock might be initiated, as it were, into the full enjoyment of their rich succulent provender.

Again—a farmer sometimes attends a fair, and purchases a lot of sheep that have been driven a long distance, and for several days have had little better grazing than they could pick up along the side of the drift-way. When he gets them home he immediately turns them on to his best grass, and, by this imprudent act, introduces fever or dysentery into the flock. Had he, on the contrary, placed them on a short, cool pasture for a few days, their condition would have improved, and the tone of their stomach and bowels have gradually risen to due strength for the reception of richer food.

The farmer, on purchasing his stock, would do well to inquire into the description of the soil to which the lot had been previously accustomed; and also into their previous habits, as whether they had been folded, &c. If the sheep have been bred on land much superior to his own, he would be wise to reject them, for they are unlikely to thrive on inferior pasturage. If they have come from inferior soils, he must be very careful in preparing them, by gradual indulgence, for the richer feed to which they are about to be ransferred.

I will add but one more observation. A wise farmer will never confide his flock to the exclusive and unwatched care of his shepherd, however clever or trustworthy that servant may be.

I shall now proceed to a short review of those complaints which are incident to parturition and call for obstetric aid; and before I enter on this topic, a few general remarks on the subject of breeding may not be out of place.

It has long been a disputed point whether the system of breeding *in-and-in,* or the opposite plan of frequent crossing, is the most certain of maintaining the character of the stock. Mr. Bakewell always adopted the first plan, and with success: arguing from nature, there is certainly great reason to believe that, with gregarious animals, it is the proper course; for that herds of deer and wild cattle, which can only breed in close affinity, maintain their peculiar qualities without degeneracy, is notorious to every naturalist, so long as the pastures over which they range are adequate to their support.*

Note by Professor Owen.

* In reference to the important and interesting question of the disadvantage or otherwise of the system of *breeding in-and-in,* I reply, that, in common with most other physiologists, I regard it as likely—I may say certain—to end in the deterioration of the stock; that is, if the system be strictly adhered to. One can readily understand that in a good stock—say of sheep—it may be long before the ill effects of the *in-and-in* system begin to manifest themselves, because such a flock may be compared with the human population of one of the small islands of the Pacific. Here, though the community be small, marriages may take place between cousins removed to the sixth, eighth, or tenth degree:—all indeed of the same stock or race, but of degrees of consanguinity sufficiently remote to obviate the bad consequences of the system of breeding *in-and-in* understood in a strict sense. I would beg to observe, however, that with regard to those ruminants which are perhaps the most gregarious, and at the same time localised in a state of nature, as the deer, a special provision seems to have been made, in the peculiar economy of the growth and shedding of their antlers, to secure the propagation of the greatest part of the herd to the strongest males, when at the period of their greatest perfection. The antlers, as is well known, increase in length and the number of snags, as they are successively reproduced each year, until the hart or buck has attained his primest strength and activity. He is then able to beat off both the younger and the older and heavier males, and to choose his seraglio of does or hinds, which become the mothers of the greater part of the next produce.

It is thus, I suspect, that the ill-consequences of breeding *in-and-in* are in part obviated in the fallow-deer of our parks. With respect to the red-deer in their wilder and more extended ranges, the intermixture of the blood of different herds is more likely to take place. I am not aware of any experiment where breeding *in-and-in* has strictly been carried on through many generations; that is, where a male and female offspring of the same parents, have been put together, bred from, and their progeny in like manner prevented from making other alliances. This should be done before the system of in-and-in breeding can be decidedly pronounced to be a deteriorating one or not, and then the experiment might be modified, to

It is also within the experience of every farmer in large breeding counties, that, in certain cases where a remarkably good stock has been acquired, the breeder is even jealous of the introduction of a stranger into his flock, and proceeds on the *in-and-in* system for many years, with no perceptible falling off, and indeed generally with obvious improvement in his breed.

Lord Somerville, whose name is high as an agricultural writer, was decidedly opposed to crossing dissimilar breeds; and Dickson, in his 'Practical Agriculture,' ranges himself on the same side. On the other hand, it has fallen within the observation of every person, that, even in the human race, frequent intermarriages in the same family, in successive generations, have a tendency to reduce the offspring in vigour and size, and to perpetuate constitutional affections. So, again, to return to the animal creation, it is perfectly understood that the race-horse degenerates in speed, and especially in strength, if too much of the same family is allowed to remain in the stock: while there is scarcely any sportsman, who has been in the habit of breeding his own dogs, that has not perceived a gradual but certain diminution of size and power in such as are bred on the *in-and-in* principle. I have been informed by a friend, who for many years has had in his kennel a particular and valuable pointer breed, that he has uniformly found all the puppies weak and diminutive after the third degree in lineal descent, if bred without a cross; though the properties of scent and docility seem in no measure lost. The truth would seem to lie between the extremes. It is well known that in all animals like begets like, and that this principle is so general that faults and defects, as well as strength, size, and other qualities, descend hereditarily. So long as the inherited qualities are on the favourable side, it would seem impolitic to cross the blood; but, if, in the course of time, any peculiar deficiency of form in the proportion or symmetry of the animal becomes conspicuous,

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ascertain the extent of deviation from strict in-and-in breeding requisite to check its ill effects.—*January 25th*, 1840. RICHARD OWEN.

In communicating this note, kindly transmitted at my request by Richard Owen, Esq., F.R.S., Hunterian Professor of Comparative Anatomy to the Royal College of Surgeons, and Vice-Chairman of the Zoological Society, I may remark, that whenever, in my South Down flocks, breeding in-and-in has been tried, I have found the produce deficient in size and constitution. In my park at Goodwood, the fallow-deer are smaller than formerly; I believe, because no fresh blood has been introduced. In the Highlands of Scotland, it is well known that the Red Deer Stags often, at the rutting season, travel many miles to other forests, where they remain for a certain time, and then return to the district from which they came. In-and-in breeding is, therefore, to a certain extent avoided, and the deer have not, as far as I can learn, degenerated.—RICHMOND.

it will be prudent to introduce a different stock, excelling exactly in those points where the breeder feels his own to be defective.*

There are one or two general maxims, connected with breeding, which I may be allowed to mention.

It is a common ambition with the farmer to choose a ram that will produce a large and early-fatting stock. Where the pasturage is rich and abundant, this is a correct principle; but the breeder must be governed by attentive consideration of these circumstances. He must regulate the size of his stock by his means. A kindly disposition to early fattening is of course a powerful recommendation of the ram, but, if the progeny is larger in size than is consistent with the economy of the farm, the breeder will not eventually prove a gainer.

The particular defects of the existing stock should be closely considered in the choice of a foreign ram. Perfection of form and disposition combined are the great objects. A perfect form in a sheep, or indeed in any animal, is rather matt r for the eye to judge of than for verbal explanation; still it may be observed, that just proportion of all the parts, vivacity of eye, roundness, depth, and capacity of chest, a straight back, clean and upright limbs, rotundity of barrel, and breadth of loin, are regarded as the principal and best points of a sheep; and it will usually be found that, where this symmetry of appearance is combined the disposition to fatten early will accompany it.† A practical man will scarcely require the caution that, in a well-conditioned sheep, it will be prudent to form his opinion by the frame of the animal, and not by the roundness and beauty of his outline, for that may be occasioned by his apparent condition, artificially got up for show, while his actual and true form will be found, on handling, to be imperfect.

I consider the following to be a very correct definition of the figure and points of a perfect New Leicester sheep:—"The head should be hornless, long, small, tapering towards the muzzle, and projecting horizontally forward; the eyes prominent, but with a quiet expression, and not placed far asunder; the ears thin, rather

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* There can be no doubt that fresh blood in a flock is absolutely necessary to keep up the constitution; you may retain your good shape and aptitude to fatten, but by breeding too long in-and-in you will lose that strength of constitution which in South-Down sheep especially, after all, is that which has spread them over the whole kingdom, and has made them so valuable.—JOHN ELLMAN.

† I am of opinion that even the most sanguine are not aware of the difference in profit between feeding-off ten acres of turnips, and hay in proportion, with well-bred sheep (that will lay on flesh quick, and bear a heavy fleece of wool), and with those of an inferior description (slack made, thin-chested, light-coated, meagre sheep), unless they have actually proved it.—W. HUMFREY.

long, and directed backwards; the neck full and broad at its base where it proceeds from the chest, but gradually tapering towards the head, and being particularly fine at the junction of the head and neck; the neck seeming to project straight from the chest, so that there is, with the slightest possible deviation, one horizontal line from the rump to the poll. The breast broad and full, the shoulders also broad and round, and no uneven or angular formation where the shoulders join either the neck or the back, particularly no rising of the withers, or hollow behind the situation of these bones. The arm fleshy through its whole extent, and even down to the knee. The bones of the legs small, standing wide apart, no looseness of skin about them, and comparatively bare of wool. The chest and barrel at once deep and round, the ribs forming a considerable arch from the spine, so as in some cases, and especially when the animal is in good condition, to make the apparent width of the chest even greater than the depth. The barrel ribbed well home, no irregularity of line on the back or belly, but on the sides the carcase very gradually diminishing in width towards the rump. The quarters long and full, and, as with the fore-legs, the flesh extending down to the hock: the thighs also wide and full, the legs of a moderate length, the felt also moderately thin, but soft and elastic, and covered with a good quantity of white wool, not so long as in some breeds, but considerably finer."—*Youatt on the Sheep,** p. 165.

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* The following is my own account of the points, &c., of the New Leicester Sheep, which, although not so scientifically drawn up, has perhaps the merit of correctness and originality:—The head devoid of horns, and rather small for the size of the animal, with an expansive and flat forehead; eyes clear and prominent; the part underneath the eyes deer-like, with black and distended nostrils; the ears long, thin, and pointed: some countenances have a blueish cast, whilst others are thickly covered with short white hairs. The neck small at its junction with the head, slightly arched, and gradually increasing in size, until lost in the bosom; throat clean, and free from superfluous flesh. The bosom or chest wide and deep, fore-legs far apart, small below the knee, and gradually tapering above, until imbedded in the shoulders; in well-fed animals the circumference behind the shoulders is very great, with a proportionably decreasing curvature towards the hips. The back, loin, and hips are in a straight line, the fat at the extremity of the latter protruding over the tail, whilst the loin is broad and full; when in high condition, and possessing perfect symmetry, a small cavity will be discovered on handling, running along the back, but more perceivable over the loins and hips. The tail at its base is wide, gradually tapering to its apex. The thighs are fleshy, but not coarse; the hocks rather crooked; the bone altogether of the legs particularly small. The pelt or skin is thin and elastic, and the animal covered with wool of a moderate length and fineness, varying in weight from 5 to 8 lbs. or more. To this description it may be added that, when the neck is small, the hind-quarters are generally bad, and the constitution delicate; on the contrary, when the neck is large, the animal is coarse and hardy, but does not possess much aptitude to fatten.

THE AUTHOR.

Tameness and docility of temper are qualities of great value, because a sheep of quiet disposition is more inclined to improve in condition. On a similar principle, the breeding farmer will not only consider the quality of his pasturage, but the temperature of his situation. Where the farm is bleak and exposed, it is essential to inquire into the hardiness of the stock which he places on it.

A shearling ram is usually preferred to an older sheep, it being considered that he is more active, and begets a more vigorous produce. When the rams have been unnaturally forced from an early age, this principle is a correct one; but, where no artificial means have been used, the full strength of nature is not fully developed until they attain their second year; and procreation before maturity is almost universally regarded as debilitating to the parent of either sex, while the value of the offspring is by no means insured by it. A remarkable proof of this may be found in the stinted proportions of all the East Indian tribes, where marriage generally takes place at the early age of fourteen. Who that has injudiciously allowed his ewe-hoggets to breed, has not seen this truth strikingly illustrated?

While the ram is with the flock, in order to insure a good fall of twins it is necessary to keep the sheep well and on extra food. It is an excellent practice to withdraw the rams from the ewes once a-day, and to give to each a pint of split beans. The period of gestation with the ewe is about 152 days. It is peculiar to the sheep to be very accurate in its period of gestation, so that in a thousand ewes the probability is that four-fifths of them will not vary above a few days.*

The farmer must be guided, as to the time when he admits the tups, by the provision that he has made for the ewes after lambing. If that provision is scanty, he will find the lambs stunted in their growth. It will also be prudent to begin the riding season not only at such a period as may consist with a good supply of nutritious feed, but with a view to the climate. Although, in the southern districts, the depth of winter may be considered to occur in January, yet there are many places which, being comparatively sheltered or exposed, may be said to be two or three weeks earlier or later than other districts; and, as we ascend northward, the difference of a very few degrees of latitude will be found to vary the season yet more.

These combined considerations seem to point to the month of March as most favourable for the lambs; and, except in very rich

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* M. Tessier, in his Memoir read before the Académie Royale des Sciences, gives a very satisfactory illustration of this. In 912 ewes the shortest period was 146 days, and the longest 157 days, or, reckoning 5 months, 7 days over and 5 under.—W. Youatt.

and sheltered pasturage, I should not recommend an earlier time. Where, however, these advantages are enjoyed, the lambs will fall most profitably in January or February, because they will be sooner fit for the market. The farmer will of course be careful, before he admits the ram, to inspect the ewes closely, so as to satisfy himself that they are all in healthy and good condition. No other preparation of them seems to be required.

I consider 60 ewes to be quite sufficient for one ram. Sometimes, when the stock is highly prized, a greater number is allowed: and I have heard of even 200 lambs having been got by a single ram. In such cases, however, the ram is not allowed to mix with the flock, but the ewes are selected and brought separately to him. This practice was adopted by several friends of mine in the west of England, who used to know the ewes that were ready by employing a teazer, and then bringing them to the ram in succession. But even in this way the ram cannot impregnate more than 100 ewes, with safety to himself, or any degree of certainty as it regards them.*

It has been my practice to mark the breasts of my rams with ochre; and when a score have been served, I dot them on the near shoulder with a brush made of a tuft of wool, dipped into oil and ochre. After the lapse of a week I dot those that are

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* Having chosen rams from the best flocks, it is an excellent plan to put a certain number of ewes to each individual ram, and let them remain separate from the other ewes until most of them have been served, marking the difference in the stock of each as they fall. Should it be found that any of them possess qualities likely to be injurious to the stock, use them no more: if, on the other hand, you find any, or even one, of them produce stock having the combined qualities of a good fleece and a good carcase, employ a teazer marked on the chest with grease and ochre: as fast as the ewes are at ram, put them to the sheep, and allow him to leap them twice, and thus you may have from 100 to 150 lambs, and not distress your sheep so much as in obtaining one-half the number in allowing the sheep to *remain* with the ewes. When the ram is turned in with the ewes, he will leap favourite ewes a great many times to the *neglect of others*, and this is the case when there happens to be only one or two of the ewes at ram: therefore, by adopting the previous plan, you will obtain more of your best blood, and thus improve your flock to fatten and your stock to breed from, without expense or injury to your sheep, thereby making the best of your prize—as a *prize* I call it to possess a ram that produces good stock.—W. HUMFREY.

This is already stated, but not so explicitly; in this case it is usual to number the ewes, and take the number down in a book, together with the day of the month on which the ewe was impregnated, a plan which will allow you to form a pretty correct judgment of the day on which the ewe will lamb.—THE AUTHOR.

It is not very easy to procure a ram perfect in all his points; ewes, therefore, should be selected to be put to him which are good in the points in which he may be the most deficient. This, in fact, is the secret of having a good flock. The expence is but trifling; and if a good flock will not pay I am certain a bad one will not.—RICHMOND.

signed in the mean time on the near side, then the third lot on the near hip, reversing the side at the next occasion. If any return to be served again, which is usually the case after 15 days, I make a fresh mark on the place to which lot it belongs. This system enables me to draw out my early ewes, and keep them in a yard a few nights before lambing. Many may think it of small importance to know which ewes will be the first to lamb, but my reason is that I dislike the favourite system of keeping them folded (except only for a few nights previous to lambing): it makes them susceptible of cold, and this is often followed by inflammation of the womb. I am aware that the plan of marking my rams with ochre is rather uncertain, for they sometimes leap the ewe without connexion taking place; but it is the best, and indeed the only one that is practicable. If the ewe has not been impregnated, the failure will be discovered by her returning again to the ram in about 15 days. After the ram has been 2 months with the flock, it will generally be found that all have been served, and then he should be removed. Sometimes he is suffered to continue with them, but the effect of this is that every here and there an ewe will prove in lamb at a late period of the summer, when she is in good condition, and would produce more by a sale to the butcher than by breeding. After the ewes are large, they should be kept quiet and undisturbed. It is not only unnecessary but prejudicial to overfeed them at this time, for it is apt to occasion inflammatory attacks at the time of yeaning. Quiet is also very important, and to secure it they should be only attended by a steady old dog; a noisy, troublesome puppy should on no account be allowed. The fences should be kept in good order, to prevent their breaking ground. If heavy ewes are galloped about by dogs, or allowed to break pasture, it will most assuredly cause them to slip their lamb: these ewes will then be offensive to the rest of the flock, independently of the danger to the ewes and positive loss sustained by the abortions.*

When the period of lambing arrives much care and attention are requisite. The shepherd must receive it as a general maxim to be most attentively observed, that *Nature is the best midwife.* He must not be led by the appearance of uneasiness and pain to interfere prematurely; he must watch the ewe closely, and so long as she rises at his approach he may be assured that, whatever uneasiness she may exhibit, all is well. Much uneasiness is generally apparent—she will repeatedly lie down and rise again with seeming distress. If this occurs when driving her to fold, he

* The ewes ought to have plenty of careful exercise; that is, be brought up at nights into a straw-yard; and if the turnips on which they are fed be a quarter of a mile from the spot, it will be all the better, as all animals with young should have a due degree of exercise.—J. W. Childers.

must be very cautious and gentle in urging her. These symptoms ought to be continued for two or three hours, or even more, before he feels imperatively called on to interfere, except the lamb is in such a position as to warrant fears of losing it. In cold weather particularly the labour is likely to be protracted. Should the ewe appear exhausted and gradually sinking under her labour, it will be right to give her some oatmeal-gruel, with a little linseed, in the proportion of a spoonful of the latter to two of the former.* When the ewe feels that she is unable of herself to expel the lamb, she will quietly submit to the shepherd's assistance. In giving her this assistance, his first duty is to ascertain whether the *presentation* is natural. The natural presentation is with the muzzle foremost, and a foot on each side of it. Should all be right in this respect, he must proceed to disengage the lamb, first *very gently drawing down the legs, and with all possible tenderness smoothing and facilitating the passing of the head with his fingers, rather than forcibly extricating it*—the particular attention of the shepherd being given to these points. This may be effected by passing the finger up the rectum, until he feels the back of the lamb's head, and then urging it forwards at the same time that you gently pull the legs. Sometimes the head is sufficiently advanced, but the legs are too backward. In this case the head must be gently pushed back, and the hand, being well oiled, must be introduced into the vagina, and applied to the legs so as to place them in their natural position, equal with the head. Should the fore feet, on the other hand, protrude, they must, in like manner, be returned, and the same assistance given to advance the head. If the hind quarters present themselves first, the hand must be applied to get hold of both the hind legs together, and draw them gently but firmly; the lamb may often be easily removed in this position. It is no uncommon occurrence to find the head of the lamb protruding and much swollen; but still by patience and gentle manipulation it may often be gradually brought forward; or even Nature, not unduly interfered with, will complete her work, if the pelvis is not very much deformed. Should, however, the strength of the mother be rapidly wasting, the head may be taken away; and then the operator, pushing back the lamb, may introduce his hand, and, laying hold of the fore-legs, effect the delivery. It also often happens that the legs are thrust out to the shoulder, and from the throes of the animal it is not possible to replace them, so as to get up the head of the lamb; by partially

* When the ewe, under these circumstances, requires support, oatmeal-gruel, with treacle and one gill of ale, will be found a warm and comforting drink: and, after a difficult time of lambing, when inflammation is to be apprehended, rye-meal gruel, with a good proportion of treacle (without the ale), will form an excellent restorative.—J. W. Childers.

skinning the legs you may disunite them from the shoulder-joint, there will then be room for the introduction of the hand, and by laying hold of the head you can deliver the ewe. A single season of practice will do more than volumes of writing to prepare the farmer for the preceding and some other cases of difficult labour. But let him bear in mind that as a general rule that the fœtus should, if possible, be placed in its natural position previously to any attempt to extricate it by force. When *force* must be used, it should be as gently as is consistent with the object of delivery. I need scarcely observe that the ewe must be the object of careful nursing and care, until she is completely restored. This will occur very rapidly unless the womb has protruded in consequence of the severity that has been used. In this case it must be replaced without delay, or violent and fatal inflammation will arise from its exposure. When replaced it should be retained in its position by a couple of stitches passed through the lips of the extreme parts. The ewe should be removed to a warm yard for a few days, and fed on gruel twice a-day. Even when the uterus is not displaced, it often occurs that violent inflammation shows itself. Bleeding copiously, if the strength of the animal will admit of it, and opening medicines, are the only remedies on which reliance can be placed. This, and all other similar complaints, are most usual with ewes that have been too well fed during gestation.

The mode of replacing the uterus when it has fallen in parturition, or otherwise, is to lay the ewe on her back, and, while two persons raise the hind quarters by the legs a little distended, the operator, with his hands well greased, will gradually replace the uterus in its natural position, and, before the animal is allowed to rise, two stitches must be introduced by the aid of a curved glover's needle and a very thin strip of white leather across the bearing as to prevent a second protrusion. Leather is the most convenient ligature,* and, when the operation is performed, thirty drops of laudanum may be usefully given to allay spasmodic action.

I have passed over the subject of *inflammation of the womb* rather lightly, partly because its treatment does not essentially differ from other inflammatory and local affections, and partly because when it does occur it is generally an incident to parturi-

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* Small sticks of leather remain much longer without sloughing out than with any kind of silk or twine; but the best material for these and similar operations, is a metallic suture, formed of a kind of Britannia-metal, with a little more than the usual quantity of lead in it. It can be procured at any pewterer's, and will be retained even twice or thrice as long as the leather. —W. YOUATT.

I think the metallic suture far preferable to slips of leather, as the latter frequently sloughs off, or unties in a few days.—THE AUTHOR.

tion, and hence is immediately perceived; but it may not be out of place to call attention to some of the peculiar symptoms by which it is indicated. It mostly makes its appearance on the third day after yeaning. It will be observed by the shepherd that the ewe frequently stoops to pass her urine, as if she voided it with pain, and it is not unlikely that the water will be found high-coloured and tinged with blood. Her breath is short and intermittent; she lies down and occasionally appears to have labour-pains; she droops her ears, and neglects the lamb, as if unconscious of its presence: if slightly pressed on her hind quarters she sinks almost to the ground, and the movement of her limbs is visibly painful and distressing. Eventually the hinder parts swell, mortification ensues while the pain abates, and then death follows rapidly. As soon as the earliest of these symptoms appear, bleeding at the neck should be promptly resorted to, and one bleeding until she faints will be more beneficial than the repeated use of the lancet without fainting. Fomentation of the external parts and those immediately adjoining will afford relief, and an ounce of salts should be given every four hours. I am not fond of injections in such cases, but, if this treatment does not relieve the pain, it may be expedient to inject into the uterus a lotion consisting of four ounces of poppy-heads boiled in four pints of water until reduced to two pints, and then strained, and made with linseed into the consistency of a thin gruel. If the inflammation has attained a considerable height before the disorder is perceived, and there is reason to fear the commencement of mortification, (which will be perceived by increasing debility and decreasing pain,) bleeding and purgatives will be too late, and a strong antiseptic drink must be substituted for them. I have used for this purpose the mixture of bark, ginger, and tincture of camphor, mentioned in the Appendix (No. 9), and I have also poured into the vagina a liniment of soap, opium, and oil, in the form given in the Appendix (No. 10). Little chance however remains of saving life when once inflammation has terminated in mortification, unless the constitution is naturally very vigorous.*

Inflammation of the udder is no uncommon disorder after yeaning, and it often proceeds from the shepherd's neglect. Imme-

* The mortality amongst the ewes, on ten farms in the neighbourhood of Saffron Walden, during the lambing season, taken on an average of several years, seems to be about 4½ per cent. Early lambing, and permitting the ewes to be at large, tend to lessen the evil; while nursing the ewes, and putting them too early upon turnips, colewort, or rich succulent food, increase it. Some years ago I was assured by several flock-masters, at Ilsley, in Berkshire, that they seldom lost a single ewe in lambing on the Downs, the situation of which seemed to be very much exposed.—Braybrooke.

diately after lambing the ewe should be examined to see that "all is right," and if milk can readily be drawn from both teats there is no danger to be apprehended; but if, on the contrary, the passages appear closed, and the milk is drawn with difficulty, there is reason to fear that it will coagulate in the udder and produce miliary fever. The teats, in such case, should be well fomented with warm water, and persevering efforts must be made with the hand, well lubricated with lard, to draw off the milk. These efforts will usually succeed, but, should the obstructions still continue, recourse may be had to mechanical aid, and a small bodkin or knitting-needle must be thrust up the passages of the teat, in order to remove it. A more common case, however, of suppressed milk is when the ewe having for a length of time been suckling twins; one of them dies, or is removed; the remaining lamb will continue to suck the teat to which it has been accustomed, and the other side becomes distended with milk from the teat not being drawn. The shepherd's attention must always be given to this circumstance, for, if relief is not afforded, inflammation will often ensue. The same will occur when one of the teats has been sore, and the ewe prevents the lamb from sucking on that side.

After weaning the ewe must be placed on the shortest feed, and milked by the shepherd twice or three times at intervals of a day or two. If, after every precaution, inflammatory symptoms show themselves,—and the difficulty of walking experienced by the ewe is one of the most decided,—fomentation long continued is the best remedy, and the camphorated mercurial ointment described in the Appendix (No. 11) will be beneficially applied to the udder, if well rubbed in. If the teats are at the same time drawn with tenderness, matter will probably be discharged from them, and relief speedily obtained. When the udder appears distended, and yet the ewe will not allow the lamb to suck, the shepherd will find that the teats are sore, and he should wash them well with warm water, and rub in the Goulard ointment mentioned in the Appendix (No. 12). The same application will be found serviceable to the lamb if there is any scabbiness about the mouth.

I shall conclude with a very few brief remarks on the manage ment of the lamb.

In cold and wet weather, and particularly after a difficult labour, the lamb will often be found in a half-inanimate state, or exhausted and weak. When this is the case the ewe should immediately be caught, and the teats milked into the lamb's mouth, the shepherd using his best endeavours to make it swallow as much as possible. It should also be well rubbed with straw, particularly the legs, in order to promote circulation. If he succeeds in restoring it to its feet, so as to stand alone, a recovery is

certain; but, if he fails in this, he must carry it into the house and immerse the animal up to the head in a pail of warm water: it should be kept in the bath about ten minutes, taking care to maintain the water at the original temperature. When taken out of the bath it should be put into the oven, moderately heated with a few wisps of straw, first rubbing it perfectly dry, or well covering it with warm flannels. In the course of an hour its bleating will show that it is restored, and it may then be taken back to the ewe, but, for a day or two, it must be carefully protected from cold.

Lambs are sometimes subject to diarrhœa of a white colour and strong smell, coming on usually a few days after birth, the bowels at the same time being distended with wind. This originates in undigested milk, and will be speedily removed by two teaspoonfuls of castor-oil mixed with another teaspoonful of equal parts of ginger and magnesia. This may be given in warm linseed-gruel. If the lamb is strong, and several weeks old, a larger dose, observing the same proportions, will be required. If the purging is not thus removed, ten grains of prepared chalk, with half a drachm of tincture of rhubarb and ten drops of laudanum, given in a little new milk, may check it.

Inflammation of the navel-string, occurring a few days after a lamb is dropped, should be subdued by fomentation and linseed-poultices. A friend of mine, who lost several lambs by this complaint, tried with success fomentations of warm brine.

Swollen joints are sometimes caused by early exposure to wet and cold. The disorder appears to be rheumatic. It is in a great measure prevented by erecting a haulm-stack, such as may be easily shifted when required, so as to afford protection against the severity of the weather. The camphorated embrocation mentioned in the Appendix (No. 13), well rubbed into the affected joints, will speedily restore them.

Castration should be performed when the lamb is about two weeks old, if the animal is healthy and vigorous, but, if otherwise, the operation should be delayed till it acquires strength. No other precaution is necessary than to remove it a night or two afterwards into a dry or warm yard. I do not recommend any injection into the purse—it only tends to cause more inflammation than is requisite for healing the wound. Should the wound not heal favourably, but, on the contrary, be followed by stiffness and continued lameness, it will be expedient to open it again and remove any coagulated blood that may have collected.

A friend of the author, a surgeon, has suggested that it might be advisable to submit the diseases here described, and their treatment, to the test of experiment in different localities, under the direction of committees associated, if possible, with some intelligent veterinary surgeon. A better mode of manage-

ment would probably in many cases be discovered, and the practice of cattle-medicine rescued from the state of comparative ignorance in which it has been too long involved.

*** There is a disease in sheep which, at certain times, is very injurious, and few appear to know how to cure it; it frequently occurs in the early part of the summer, particularly after the sheep have been kept hard during the winter; and before they can recover their condition. I have never known it happen but when they were in a low state of condition. The sheep appear, when attacked, to be labouring with inward fever, attended with cough, which produces swollen lips, completely cased with a thick scab: I have sometimes observed sheep in this state to be nearly starved, and have no doubt that, owing to neglect in this stage of the disease, many have died. The best remedy I have found (and which will generally produce an effectual cure) is by pulling off the scab, which will cause the lips to bleed, then rubbing them well with the prepared oil, and afterwards anointing them with the prepared salve. This method I have generally known to cure 80 out of 100 sheep the first time they were dressed, and on a second application I scarcely ever remember its being attended with want of success.—This ought to be known to all flock-masters.—JOHN RUSBRIDGER.

Recipe for the Prepared Oil.

½ pint of linseed-oil
½ pint of elder-oil
1 oz. of verdigris.
Those three articles to be used as oil.

Recipe for the Prepared Salve.

¼ lb. of fresh butter
1 oz. of verdigris
2 oz. of rosin
¼ lb. of Venice turpentine
½ oz. of alum
2 table spoonfuls of tar.

"The above six articles to be simmered together, and used as ointment."

APPENDIX.

No. 1.

Quicksilver	1 lb.
Venice Turpentine	½ ,,

Rub them well together, without intermission, in a marble mortar until they are well incorporated, which will take at least eight hours; then melt, over a slow fire, 5½ lbs. of hogs'-lard and ½ lb. of resin; when luke-warm add the other ingredients, and keep it stirred until cold.

No. 2.

Corrosive Sublimate	1 ounce
Spirit of Wine	¼ pint

The sublimate to be dissolved in the spirit of wine, to which add three quarts of spring water.

No. 3.

Flowers of Sulphur	1½ lb.
White Hellebore, in powder	½ lb.
Train Oil	1 gallon

To be kept stirred whilst using; many add red ochre, but it stains the wool, and is of no material benefit. If a powder be preferred, one pound of white lead must be added instead of the oil, to be dusted on with a flour-dredge, and afterwards sprinkled over with water, and rubbed well in to make it adhere.

No. 4.

Soft Soap	15 lbs.
Tobacco	2 ,,
Arsenic	2 ,,

These ingredients are to be put together into an iron pot, and boiled with five pails of soft water for half an hour. To two pails of this mixture when boiling hot add five of cold water, to render it about new milk warm, and as it wastes in the operation of dipping it must be renewed in the same proportions. The lamb must be immersed in the liquid, with the exception of its head, for a few seconds; a sort of cradle or ladder must then be put across the tub, so as to admit of placing the lamb on it, whilst the superfluous water is again pressed from it. This will be sufficient for 150 lambs.

No. 5.

Blue Vitriol	½ ounce
Gunpowder	1 ,,

Rubbed together into a fine powder, and mixed with hogs'-lard sufficient to make the whole into the consistency of a paste. This recipe has been practically found to be an excellent remedy, although the second of its ingredients is not a recognised article of materia medica. The following is certainly more scientific and perhaps equally efficacious:—

Acetate of Lead (or Sugar of Lead)	1 ounce
Sub-Acetate of Copper (or Verdigris)	½ ,,
Sulphate of Copper (or blue Vitriol)	½ ,,

Formed into a paste in the same manner as the other.

No. 6 (Mr. Clater's Recipe.).

Nitre, in powder	6 ounces
Ginger, fresh powdered	4 ,,
Red Oxide of Iron (or Colcothar), in fine powder	2 ,,
Common Salt	3½ lbs.
Boiling water	3 gallons

Pour the water hot upon the ingredients; stir them, and when lukewarm add to every quart of the mixture 3 ounces of spirit of turpentine, and bottle for use. Dose: 4 table-spoonfuls every fourth day fasting, repeated for three times.

No. 7.

Compound Tincture of Cinnamon and Tincture of Catechu, of each	2 drachms
Prepared Chalk	1 scruple
Laudanum	20 drops

Mixed, and given in half a pint of warm oatmeal-gruel.

No. 8.

Spring water	$1\frac{1}{2}$ pint
White Vitriol	1 scruple

Mixed, and the eyes to be bathed with it twice a-day.

No. 9.

Peruvian Bark and Powdered Ginger, of each	1 drachm
Compound Tincture of Camphor	1 ,,

Mixed in half a pint of warm gruel, and sweetened with sugar or treacle.

No. 10.

Soap and Opium Liniment	1 ounce
Linseed Oil	1 ,,

To be shaken together when used.

No. 11.

Mercurial Ointment	3 ounces
Camphor, well rubbed down with Spirit of Wine	2 ounces
Hogs'-Lard	$\frac{1}{4}$ lb.

The ingredients to be carefully incorporated, and to be well rubbed in twice a-day.

No. 12.

Goulard and Spermaceti Ointment, of each	1 ounce
Alum, finely powdered	2 scruples

To be mixed for use.

No. 13.

Compound Camphor Liniment	1 ounce
Laudanum	3 drachms

To be mixed for use.

XXXV.—*Practical Statement of the Formation of an Economical Water-Meadow.* By William Paxton, Esq.

To the Secretary of the English Agricultural Society.

Sir,

Being in the occupation of a meadow, containing 20a. 2r., situate in the parish of Bicester, in the county of Oxford, which, from time immemorial, had been subject at certain seasons of the year to floods (causing the land to produce flags and all sorts of aquatic plants, to so great an extent that some parts of the produce were of little greater value than to lay into the yard to make dung), I was determined, in the autumn of 1838, from the confidence I had in my landlord (being only a tenant-at-will), to try, at my own expence, the effect of irrigation on the said meadow.

My first object was to ascertain, as near as I could, the probable expense of carrying my views into execution; this done, my next step was to satisfy myself of procuring a proper supply of water, and its quality. This also, on trial, proved satisfactory, it being the produce of a spring oozing out of limestone rock and marl strata, distant from the spot about two miles, which was brought to the meadow by the brook adjoining, as seen on the plan. Having succeeded so far, my next step was to throw a dam across the brook, and to do it in such a manner that it would not cause my neighbour's land on the other side to be inundated; therefore I made a sort of moveable dam or sluice, which I can put up and down at will, so as to regulate the water sufficiently for my purpose without doing injury to the opposite lands. My next object was to make myself sure that I could get the water off as quick as I could get it on; in this I was a little puzzled, as the middle part of the meadow was the lowest, being nearly as low as the bottom of the brook. This caused some consideration and trouble: however, a thought struck me that I would carry the main drain through the whole length of the mead, and dig it deep enough over the rising ground, which I did, and again succeeded to my entire satisfaction, as on this depended the completion of my enterprise. I next turned the water out of the brook over the whole twenty acres, in order to ascertain the levels, which I did by sticking down pegs and laying bits of turf in the hollow places level with the top of the water. I then let the water off by the main drain, which was already dug for that purpose; this enabled me to carry the water by small floats to the high parts, and to make all the small drains in the low parts, which made it something like running from ridge to furrow. I used no spirit level, but proved the levels with the water. Be pleased to observe that when I let the water on the land, all that part of the brook below the dam was empty, which then became the prin-

cipal receiver for all the drains in the meadow. The accompanying plan will show the form of the meadow, and point out all the various conductors, feeders, and floats, with the main drains and small drains for letting the water on and off. During the time the work was in hand I attended my labourers four or five hours each day, or as much time as I could spare; which I am convinced tended much to lessen the cost, as my object was to execute the work in the cheapest and most simple manner.

I gave for digging all the main conductors and large drains 4*d.* per rod; for the medium drains 2*d.*; and for the small floats and drains 1*d.* per rod: the whole cost of this was 27*l.* 10*s.*; 10*l.* the sluices, and 5*l.* making the dam across the brook; making the whole cost 42*l.* 10*s.*

In the beginning of the present year I began to float the meadow, and had not applied the water long to the land before I observed an evident improvement. I wish also to state that, on some of the worst parts of the meadow, where the flag-roots and aquatic plants were so blended with the soil, I dug the whole and laid the top downwards. I did not lay the spits too close together, but left sufficient room between each for the grass to shoot up; and, to my great surprise, the whole of the flags and aquatic plants disappeared, and an entire fresh herbage of good quality sprung up in their stead. If there were any difference in the crop, I think this spot had the advantage; the whole however produced the best crop I have ever seen, and which was cut in June last, and yielded more than 2 tons per acre, which was of double the value of any crop which I have had from any part of the said meadow, in any season, these last 20 years. As soon as the grass was mowed and the hay cleared off, I let on the water again; and, in about 5 weeks, there was another crop fit for the scythe; but, having had enough hay-making in such a wet and trying season, I was afraid to encounter the second crop for hay; consequently, I turned in my cattle, consisting of horses, cows, and sheep, all of which appeared to do well: but when the working horses were taken up again to their work, they each and all were seized with a relaxation to such a degree that I was fearful some of them would die. This leads me to doubt whether the hay* or grass produced from water-meadows is proper food for working

* The Duke of Richmond, having applied to the Duke of Portland for his Grace's opinion on the effects of water-meadow hay as food for horses, has received the following communication:—

"There is reason to believe that water-meadow hay is not good for horses working on wind; but, for all other purposes, it is quite good. On account of its succulency, the grass is difficult to be made into hay, and requires much time.—Horses of every description, and cattle, thrive greatly on the meadows themselves; and I should say that, unless they give the rot

horses, though it answers well for milking cows and, in the spring of the year, for sheep,—say, until June, but no longer. The mode I adopted in putting on the water was to float about one-half of the meadow at one time, letting the water on about 3 days and nights, and allowing it the same time to drain off, and so on alternately until the beginning of May, when I ceased.

The fall of the water from the highest part (near the dam) in the brook to the point where the main drain empties itself again into the brook is, as near as I can ascertain, 22 inches.

I am, Sir, yours truly,
William Paxton.

Langford Farm, Bicester, Oxon.
Sept. 16th, 1839.

XXXVI.—*On Argyleshire Cattle.*— By E. F. Welles, Esq.

To the Editor of the Journal of the English Agricultural Society.

Sir,

Some years ago I published a letter in the 'British Farmers' Magazine,' giving an account of the transplantation of a small herd of Argyleshire cattle into the fertile pastures of Herefordshire, and threw out some suggestions as to the probable results. From the time that has since elapsed (I believe as much as 15 years), I am, from being in the habit of seeing and making observations on them, enabled to speak with more accuracy and certainty as to the effects which have actually taken place, which are perhaps less material than might have been imagined, after such a lapse of time. I believe this to be the only attempt at the introduction of a breeding-stock of this sort into the county. They are in the hands of Edward Poole, Esq., a gentleman who, from his connexions in the north, where he has estates, was enabled to procure some of the best blood, principally from the well-known stocks of Lord Strathmore and the Duke of Argyle.

After he had bred from them for a few years, I took a journey myself into Northumberland, and purchased half a dozen cows

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to sheep, they are the most wholesome pasture for them, as well as for horses and cattle: but my meadows are all apparently perfectly dry.
" *Welbeck, Jan.* 5, 1840. Scott-Portland."

There is a general impression amongst owners of horses that hay grown on low and moist meadows is not so good for working horses as upland hay: but the hay which is usually called lowland hay is not produced on water-meadow with porous subsoils, or well underdrained, as all good water-meadows should be. The hay produced on such water-meadows is of a much better quality and more nutritious, and may probably be very fit for working horses.—W. L. Rham.

and heifers of Mr. John Bates, of Hedden, near Newcastle, a gentleman who had bred them, with great care and judgment, for as much as 25 years, deriving his blood from the most eminent breeders in Argyleshire and the Isle of Skye. They bore a somewhat different character to those Mr. Poole had previously obtained, chiefly in the length and gay appearance of the horns. These had been bred and kept exclusively upon moor land of very inferior quality. The colours of those previously procured consisted of light and dark dun, cream colour, red, and black. A portion of this new blood from Mr. Bates was infused into the former stock of Mr. Poole; and with that intermixture alone the present stock has been raised. The herd is not a large one, perhaps consisting of 12 or 14 cows; and one of the most important benefits accruing from them has been, that, from his practice of thick and hard stocking, he has been enabled to increase his number considerably on the same quantity of land: and it may be observed, that they graze the pastures as equally, and almost as close, as sheep.

This gentleman accustoms all the best milkers to the pail, and finds, with gentle usage, they are mostly tractable, and give a fair quantity of milk, of a quality little inferior to the Alderney. Their form has been generally improving, from care in the selection of the bulls; but as it often happens that many of the best-shaped heifers have turned out inferior milkers, and as the milking quality has been held to be indispensable, the general adoption of the truest form has been much retarded. They have in general been exceedingly healthy, and have been subject to few diseases or accidents. There has been no great increase of size, and but little variation in the coat. Some individuals, at their first introduction, varied from others considerably in their quality, and so they continue to do; and those which possessed a profusion of mossy or curly hair are relatively, as to their family, the same at the present time. I think an increase of size is more observable in the bullocks that are bred from them. I have known a pair of these fetch in Hereford fair the same price that was obtained for a pair of moderately good Herefords; having been reared and kept alike. The quality of their flesh generally leaves nothing to be desired; and their aptitude to feed is surpassed by none. Having been constantly under habits of domestication, they retain little of the wild and suspicious looks usual with them at their first introduction on the sudden approach of strangers. I confess I felt anxious to see some crosses made with the Herefords—not without the anticipation of its being beneficial—but it did not even in the first cross (which is generally the best), succeed s well as I have observed it in other breeds; and, although the Hereford is in general of a dark red, the produce from the cross

was almost invariably of a lighter colour; and when the cross was carried on with the Hereford blood too, the animals so bred had rather deteriorated than improved: there was, too generally, much more waywardness of temper.

Within these few years an accidental variety has arisen. One of the cows, having a small portion of white, produced a spotted calf; and this being a bull, the proprietor was induced to keep him as such; from which, if equally good in other qualities, he might add to the beauty of his stock, as the tenants of a richly-wooded domain. That object has for several years been successfully carried on, and without any deterioration of any important essential. The mixtures that have already taken place are chiefly confined to the light duns and cream colour, and a most pleasing variety they exhibit; the arrangement of the spots being curiously diversified and delicately broken and subdued by the continually shifting masses of hair.

Though Hereford is almost exclusively a breeding county, few persons give themselves the trouble of riding a little distance to view such a stock; and, though it may not be their interest to adopt it, yet, possessing so many qualities to please the most discerning breeders, it creates some surprise no more notice has been taken of it. Some few landed proprietors in Monmouthshire and the Welsh border have been in possession of some of the breed of Highland Scots for many years; but, as I have had no opportunity of examining them, or inquiring about them in that locality, I abstain from any vague or unwarranted statement. I cannot, however, avoid expressing my surprise that the experiment of placing them in different parts of the principality has not been more attended to; it being very desirable that the question should be determined, whether any physical causes exist inimical to their well-doing.

I am, Sir, yours, &c.

E. F. Welles.

Hereford, Nov. 20, 1839.

XXXVII.—*On the Mode of Making and Using Tiles for Under-Draining, practised on the Stow Hall Estate in Norfolk, &c.* By John Wiggins, F.G.S., Land-Agent. *

1. The proper earth for making draining or sough tiles is a strong or stiff clay, whilst bricks require a mild or more tender clay. The tile-earth here is a strong blue clay of the Kimmeridge

* Many modes of making drain-tiles are at present practised; and the Yester patent (founded on the Marquess of Tweeddale's invention) and se-

clay (oolitic) formation, and some veins of it, being slightly calcareous, chalk marle being near, burn white-ware.

2. The earth is begun to be raised from the pit in November, and this process is continued till February, during which it receives the wet and frost of winter which meliorates it much.

3. About the middle of February the heap is covered with sand, if the earth be too strong, in a quantity proportioned to the reduction of strength required; but, whether sanded or not, it is turned over and watered during the turning. This process is twice gone through, and is finished early in April.

4. The moulding or making commences about the beginning of April, and continues till the middle of October; the earth for common ware is turned once over, and for better ware twice or thrice, before being put into the mould, but for superior ware (called hollow ware or odd ware), such as copings, white or straw-coloured bricks for house-fronting, pavements for house-floors, &c., it should be either ground in a tub-mill (also called a pug-mill), or washed in the mill shown at E, in the Plan No. 3.

5. The relative situations of the kiln and the kilnman's house and offices, with his ground for digging, &c. An excellent arrangement of the whole is shown in the Plan No. 1.

Plan No. 2 shows the position and dimensions of the kiln, sheds, and hakes.

Plan No. 3 shows the ground plan and sections of—

1. The kiln, ground plan 16 by 12 feet clear, A.
   Section B, 12 feet high.
   Section of front arches for burning with coals, C.
   Implements used in burning, D.
2. Ground plan of wash-pit for fine ware, E, the grate opening in a large shallow pit, where the washed earth lies to dry for several months: see Plan 1.
3. Shed for Bricks to dry in (Section) F.
   17 feet wide, $3\frac{1}{2}$ high to eaves, 10 to ridge.
4. Shed for Tiles (Section) G.
   14 feet wide, 7 high to eaves, 11 feet to ridge.

Plan No. 4. Moulds, &c., for Tiles.

(*a*) Mould for large drain-tiles, $13\frac{1}{2}$ in. by $11\frac{1}{4}$ in., worked on a stock (fixed block) on which it fits.
(*b*) Form of bender (profile).
(*c*) Section of bender lengthways.
(*d*) Mould for small tile, $13\frac{1}{2}$ in. by $7\frac{1}{2}$ in.

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veral other patents have been recently taken out for supposed improvements in this new branch of agricultural manufacture: the individual merits of these different modes, however, will only be ascertained by comparison and experience.

(*e*) Section of small tile on bender, and horse or rest for it.

N.B. The ends of the moulds must be slightly scooped inwards to allow for the flat being bended into the arched form.

(*f*) Mould for large tunnel-tiles for gateways, &c., 18 in. by 15½.
(*g*) Ditto on bender.
(*h*) Small tunnel-tile mould, 15 in. by 14¾.
(*i*) Same on bender.
(*k*) Mould for the bottom tiles, 11 in. by 5½.
(*l*) Pallet of bottom tiles.

6. The kiln is of brick, first 4 bricks thick, then 3 bricks, then 2 bricks, banded round the top with iron straps, and embanked outside. This kiln holds about 50,000 small tiles and bottoms, about 30,000 large with bottoms, or about 28,000 bricks only, but about 5000 bricks are found necessary to burn the tiles well, 2 bricks occupying the place of 3 tiles. The sheds are built of oak posts, set in the ground with fir-pole plates and rafters pantiled. The kiln takes 52,000 bricks to build, of which 7000 are fire bricks for the arches, the rest common bricks; these are burnt in a clamp for that purpose, on the spot, at 20*s*. per 1000. The bricklayer's, the iron and other work in building it was 00*l*. There are 80 yards in length of shedding for bricks, costing in labour and nails to build 4*s*. 6*d*. per yard, and 40 yards in length of tile shedding, costing in labour to build 4*s*. per yard, and 40 yards of shelves, costing 2*s*. 4*d*. per yard; also 73 squares of roofing, taking 11,700 pantiles to cover, and 400 ridge-tiles. The cost of the whole establishment, exclusive of house and offices, which pay rent, is estimated at 235*l*., without timber, which is the produce of the estate, but this might have been sold for about 100*l*., and these buildings are sufficient to burn off 300,000 ware of all sorts, though requisite for half that number.

7. In the process of making the tiles the moulder fills and strikes the mould, takes it off the stock, and lays it on the bender; an attendant boy presses it to the bender, dips his hands in water and washes and smooths the tile, then carries it on the bender, and places it on the shelves shown in Section G, Plan 3, where it dries by a thorough draft, which draft is regulated by moveable reed skreens; when dry enough to move without damage they are placed one upon another on the *hakes* or piles in the sheds till placed in the kiln; the bottom tiles are transferred from the mould to a pallet-board piled 10 to 15 tiles high (*l*), Plan 4, and placed on hakes till hard enough to move; they are then separated into handfuls of 5 each, and chequered, *i. e.* placed so as to have air circulate till ready to be burned.

8. In setting the kiln it is requisite to place the ware as shown in B, Plan 3, viz., first several tiers of bricks, then draining tiles

and bricks alternating, then bricks and bottom tiles alternating. The tiles are placed thus on their ends , the bottoms in row in fives thus /////, and the next row thus \\\\\, the bricks thus . The large tiles burn to $12\frac{1}{2}$ inches long, 5 inches high, and $3\frac{1}{2}$ inches opening; the small tiles to 12 inches long, $3\frac{1}{4}$ inches high, and $2\frac{1}{2}$ inches opening; the bottom tiles to $10\frac{1}{2}$ by 5 inches, and three-quarters of an inch thick. The large tunnel-tiles when burnt are $12\frac{1}{2}$ inches long, 7 inches high, and $9\frac{1}{2}$ inches opening; the small, 11 inches long, 6 inches high, and 8 inches opening.

9. Both wood and coal are burned in the kiln, the latter requiring iron bars along the arches and doors, as shown in C, Plan 3. This kiln takes about 2000 fir-top fagots to burn off, or 1500 of better wood, viz., 1000 fagots, and 2 waggon-loads of round wood; when burnt with coals it takes about 200 fagots, or peat-turf, in proportion at first, and afterwards about 6 tons of coals. The labour of burning is greater with wood than coal, and worth 1*s.* 6*d.* to 2*s.* per 1000 more.

10. The kilnman finds everything but buildings, earth, and straw, fuel and duty (on bricks), and is paid 26*s.* per 1000 for the large tiles, 15*s.* per 1000 for the small tiles, and 9*s.* 6*d.* per 1000 for the bottom tiles. He has also 12*s.* per 1000 for bricks, and he pays a rent for the house and land. The detail of value of labour in the various processes is thus stated :—

1.—BRICKS
per 1000.

		s.	*d.*
1	Raising the earth . . .	1	6
2	Turning and watering . .	0	10
3	Moulding and haking . .	4	0
4	Barrowing to kiln and out .	1	4
5	Setting	0	4
6	Burning	2	0
7	Sand raising and carting .	0	6
8	Tools, waste, & foreman's profit	1	6
	Paid kilnman	12	0
9	Duty	5	10
10	Fuel	6	0
11	Straw, &c.	1	0
12	Grinding, extra	2	0
	Cost	26	10
	Value of bricks to sell . .	35	0
	Groundage for earth, agency, sand, &c.	8	2

2.—LARGE DRAINING TILES
per 1000.

		s.	*d.*
1	Raising earth	1	6
2	Turning, &c.	1	6
3	Moulding and drying . .	12	0
4	Barrowing to kiln and out .	1	4
5	Setting	0	4
6	Burning	2	0
7	Sand and carting	0	6
8	Tools, waste, & foreman's profit	6	10
	Paid kilnman . . .	26	0
9	Fuel	6	0
10	Straw	1	0
	Cost	33	0
	Value of tiles to sell . . .	45	0
	Groundage for earth, agency, sand, &c.	12	0

3.—SMALL DRAINING TILES per 1000.

		s.	d.
1	Raising earth	1	0
2	Turning, &c., four times, or grinding	1	0
3	Making, i. e. moulding and drying	6	6
4	Barrowing to kiln and out	1	4
5	Setting	0	3
6	Burning	1	3
7	Sand	0	6
8	Tools, waste, & foreman's profit	3	2
	Paid kilnman	15	0
9	Fuel	4	0
10	Straw	0	6
	Cost	19	6
	Value to sell	25	0
	Earth, sand, agency, &c.	5	6

4.—BOTTOM TILES per 1000.

		s.	d.
1	Raising	0	6
2	Turning, &c.	0	8
3	Making, &c.	3	6
4	Barrowing to kiln	1	0
5	Setting	0	3
6	Burning	0	9
7	Sand	0	6
8	Tools, waste, & foreman's profit	2	4
	Paid kilnman	9	6
9	Fuel	3	0
10	Straw	0	6
	Cost	13	0
	Value to sell	15	0
	Earth, sand, agency, &c.	2	0

5.—LARGE TUNNEL TILES per 1000.

		s.	d.
1	Raising	7	0
2	Turning and grinding	3	0
3	Making	50	0
4	Barrowing to kiln and out	5	0
5	Setting	1	6
6	Burning	6	6
7	Sand	2	0
8	Tools, waste, &c., foreman	20	0
	Paid kilnman	95	0
9	Fuel	20	0
10	Straw, &c.	5	0
	Cost	120	0

6.—SMALL TUNNEL TILES per 1000.

		s.	d.
1	Raising	4	6
2	Turning, &c.	2	0
3	Making	25	0
4	Barrowing in and out	3	0
5	Setting	1	0
6	Burning	4	6
7	Sand	1	6
8	Tools, waste, &c., foreman	43	6
	Paid kilnman	85	0
9	Fuel	13	0
10	Straw	2	0
	Cost	100	0

N.B.—Of these tunnel-tiles 1000 of each per annum will suffice a considerable quantity of land: and washing in the mill E, Plan 3, is worth 10*s.* per 1000, and is only practised for particular ware.

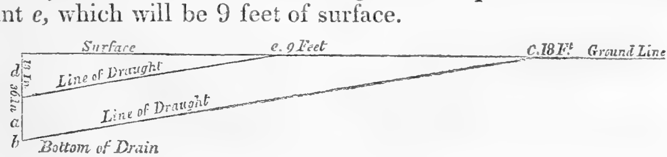
N.B.—About the year 1817, when extensive tile-draining commenced on the Stow Hall estate, the then Brick and Tile Act only authorised flat tiles to be made *free of duty* for draining of certain form and perforations, such as were supposed to render them unfit for other purposes; but the forms and perforations and dimensions prescribed by the Act rendered the tiles unfit for the purpose of draining. This defect in the law was afterwards amended.

11. The consumption of wood, from the thinnings of the fir and other plantations, is found very convenient, as it would otherwise be scarcely saleable in great quantities. On the other hand, the carriage of wood to the kiln is a great expence. The kiln is therefore to be placed as near to the plantations as possible: the

proper earth is often incident to woodland soils, and it may sometimes be worth while to plant around the kiln for future fuel.

12. After many years' experience, trials of many plans, forms, and sizes, and the use of millions of tiles, the forms and dimensions above given have been settled upon as the best, most effectual, and cheapest; and the prices are found to be such as just to enable steady industrious men to get a rather better living than by common labour, ordinary wages being 12*s.* per week; but it is evident that a certain quantity must be made to pay a foreman or kilnman: say, 200,000 of all sorts of ware. No holes in the tiles are required, because, in the process of draining, the water falls to the sides of the tile, and gets under its edge to the flat or bottom tile: the lowest drop of water is first let off by the aperture; this makes way for (and attracts) another drop, and so on to the top. The larger tiles are always sought for by farmers, if young drainers; but they are only requisite in case of main drains which have a great length of other drains to carry off the water at headlands, &c. The small tiles answer all ordinary purposes.

13. Lands in some counties are ploughed up high into broad ridges (an ancient method of drainage), the tile-drains are then placed in the furrows, and the height of the "lands" or ridges reduced by ploughing down gradually. In such cases there is a very general fear of placing the tiles too deep; and the consequence is, that they are often placed so shallow as to be filled by moles or roots, or displaced by tread of horses or cattle in wet times. In furrow-draining stiff lands, the tiles should ultimately lie 30 inches deep, after the lands or ridges have been ploughed down, but not less than 24 inches at first; and in looser and more open soils, 30 inches at first, and 36 inches at last, *i. e.*, when the ridges are thrown down, are the proper depths on the average, but more in some places, and the nearer they approximate to these depths the more effectual will be the drain; since the drain not only acts from the bottom to the top, as already mentioned in 12, but because water in descending seeks the nearest vacuity: the attraction of the escaping drop downwards is in a diagonal line from the bottom of the drain to the top of the land; thus, in the following diagram, suppose the influence of a deep drain, say 36 inches (a), to be in the line bc, as far as the point c, say 18 feet of surface; now the shallow drain (d), say 18 inches deep, can only have an influence in a diagonal line parallel to bc to the point e, which will be 9 feet of surface.

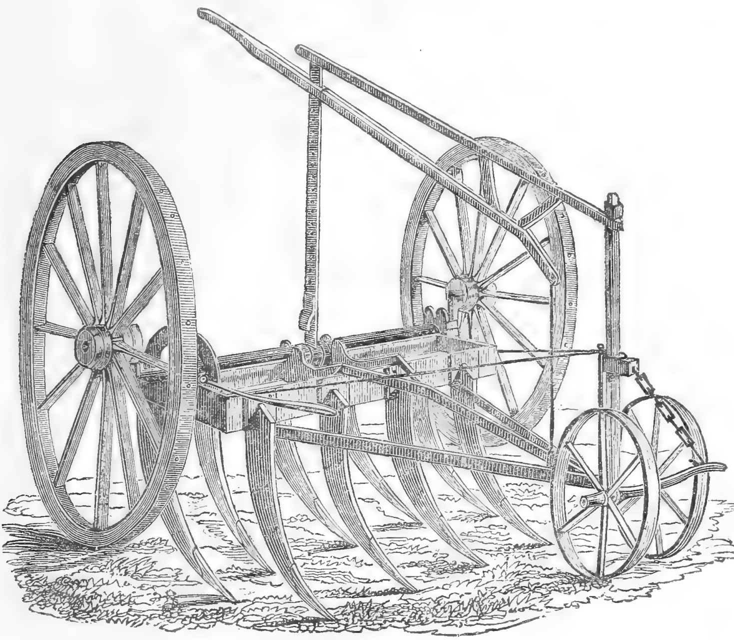


Yet both these drains require an equal number of tiles. The error of shallow draining arises from an anxiety to see no water stand on the surface: but the object of draining is not to take off the water as fast as it comes down, but so fast as to prevent injury to vegetation. It must, however, be confessed that shallow draining often arises from inefficient ditches, even where the fall is ample. If there is any apprehension of the water not going off in time to prevent mischief, the farmer should put a few loose stones over the tile before filling in, and fill in with the loose more friable top soil.

14. Inexperienced drainers with tile often deem the flat or bottom tile superfluous; but there is no security for permanence but in the flat continuous pavement, with an uniform and not too quick descent: it must lie so firm on the soil that the drainer may walk backwards on it from the lower part of the drain upwards, carefully placing the arched tiles on the bottom tiles, so as the jointings of each come to the middle of the others; and seeing that the water flows away as he goes on. Accuracy, and even nicety, in laying tiles is essential to their success.

London, July, 1839.

XXXVIII.—*Practical Experience in the use of Biddell's Scarifier.*—By Mr. Henry Case, Secretary of the South Norfolk and North Suffolk Agricultural Association.



Biddell's Scarifier.

To the Secretary of the English Agricultural Society.

Sir,

My engagements beyond my common vocation have prevented an earlier reply to your inquiries of October the 19th, respecting the use of "Biddell's Scarifier," and my own application of it, which implement I have used for the last four years in the cultivation of my farm.*

There is such a variety of circumstances which occasion the scarifier to be used, and which determine the different horse-power to be applied on each occasion, that my own method of using it, on strong hilly land (frequently with four horses), will form no criterion for the guidance of a farmer differently circumstanced.

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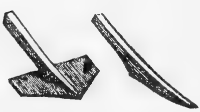
* A description of this instrument has already been given in the Report on the Implements exhibited at the Oxford Meeting (Journal, Part II., Appendix, p. lxv.)

By the use of this implement I can equally well cultivate my farm with 12 per cent. less of horses than I could cultivate the same land without it. The land intended for fallow I plough up deeply, and as early in October or November as I can; it then lies until the dry weather in March or April, when I scarify it as deep as it has been ploughed, generally three times in a place, each time followed by harrowing and rolling: it will then, in most instances, be found clean and ready for ploughing overwart (or across), but, if not sufficiently cultivated, is then scarified again.

The previous year's fallows to be followed by spring corn, on my farm, are generally scarified with four horses, two in each furrow, at length; but on lands of less tenacity than mine this scarifier is used with three horses, only two in one furrow, on that side of the stetch where the implement covers half, and one horse in the opposite furrow; in this case, a long steelyard whippletree is indispensable, and I am informed that an admirably-constructed caster-wheel is made by Messrs. Ransome, which, if affixed at the long end of the whippletree, makes it go remarkably well for the single horse.



In cleaning my pea and bean-stubbles I first use my chisel-points, and, if the land be very hard, go twice over with them, and, if necessary, then take off the points, and affix the broad blades,which cut the land clean.

At your request I have given this description of some of the uses of "Biddell's Scarifier," but the practical farmer will vary the uses according to his skill and circumstances, and will require no further directions than those contained in the printed circular.

In using this implement I have found it necessary to caution my men against suffering the horses to turn at the ends of the work, without raising the tines from the ground, which is easily performed by means of the *lever;* and, unless they pay particular attention to this, some part of the implement would be likely to be broken.

In handing you these particulars I have only aimed at simply giving you the information you requested, and as resulting from the practical use of the scarifier on my own farm; and shall be happy if I have expressed myself in such a way as may convey the intelligence you wish.

I have the honour to remain, Sir,

Your obedient Servant,

HENRY CASE.

Thorndon, near Eye, Suffolk, Nov. 1, 1839.

ENGLISH AGRICULTURAL SOCIETY,

5, Cavendish Square.

English Agricultural Society.

DEC. 18th, 1838.

REPORT OF THE COMMITTEE.

In making this, their first Report, your Committee cannot refrain from noticing that the short space of time which has elapsed since the establishment of the English Agricultural Society has necessarily limited the sphere of their labours, and has, in fact, precluded them from doing much more than laying the foundation for future operations; but being anxious that such steps as they have taken for promoting the objects of the Society should be submitted to those who, placing confidence in them, have entrusted to their care the important duty of conducting its affairs, they deem it a duty incumbent upon them to lay before the Subscribers the result of their management since their appointment on the 27th of June last. They cannot, however, proceed to the statement of their own labours without first tendering their thanks to the Provisional Committee for the valuable exertions made by them in framing rules for the general conduct of the Society. As, however, must be the case in every institution which embraces an extensive field of operation, it would be impossible for any single Committee, however diligent and zealous, to attend to all the details of the business to be transacted, one of the first acts of the Committee was the appointment of Sub-Committees, to carry into effect the objects of this Institution. One of these Sub-Committees, whose province it was to frame additional rules for the government of the English Agricultural Society, has suggested many valuable rules, which have been adopted. It will shortly resume its sittings, and will direct its attention to framing such further rules and regulations as the daily-extending connexions of the Society may render necessary.

Being desirous, as early as possible, to enlist talent in the investigation of those subjects which involve matters of deep interest to the practical farmer, prizes for essays upon a variety of topics have been offered, some of which will be awarded this day, some at the meeting at Oxford next year, and others at the country meeting to be held in the year 1840. The majority of those prizes are upon subjects directly calculated to improve the cultivation of the soil, an object regarded with special interest by the English Agricultural Society. The prizes for cattle to be given at the Oxford meeting, and through which improvement in the *breeding* of stock is mainly contemplated, will be publicly announced in a few days; and your Committee trust that the owners and occupiers of land in Oxfordshire and the neighbouring counties will co-operate in rendering the first meeting of this Society efficient for the objects for which it was instituted.

Aware of the immense loss sustained in consequence of the want of better knowledge in the treatment of the diseases of cattle, sheep, and pigs, the attention of the Committee has been turned to this subject, in order, if possible, to devise means for supplying the deficiency. A veterinary school has been long established in the neighbourhood of the metropolis, and it has been most useful in teaching the scientific and successful treatment of the diseases by which thousands of horses used to be destroyed; but its attention has been almost exclusively devoted to the horse; and it was considered that, if its labours could be directed with the same success to the management, in health and disease, of our cattle and sheep, it would be of inestimable advantage to the British farmer.

Application has been made to the Governors of the Veterinary College, stating the anxious wish of the English Agricultural Society that this most important extension of its inquiries and its benefits should take place, this Society not interfering with the arrangements and proceedings of the governors of the college, but contributing from its funds to the accomplishment of this purpose.

A most favourable answer has been received from some of the governors; and a meeting will soon take place between them and a delegation of your Committee, from which the happiest results may be anticipated.

Correspondence with agricultural, horticultural, and other scientific societies, both at home and abroad, being one of the means proposed whereby useful information may be obtained, a proposition has been made for opening a correspondence with several societies at home; from most of which, but most especially from the Highland and Agricultural Society of Scotland, your Committee has received the strongest assurances of a desire to establish a friendly communication with your Institution.

Through the assistance of an able member of your Society, who has recently been travelling on the continent of Europe, arrangements have been made for opening a correspondence with the Royal and Central Agricultural Society at Paris, the Royal Agricultural Society at Lyons, the Agricultural Society at Geneva, and the Agricultural Society at Lille.*

The diffusion of agricultural information being one of the most important means whereby the English Agricultural Society hopes to attain the objects contemplated by its establishment, diligent consideration has been given to this subject; and your Committee feels confident in stating that, early in the coming year, a plan will be adopted for circulating as extensively as possible such papers as may be deemed calculated to furnish useful information to the farmer.

Upon referring to the Report made by the Provisional Committee on the 27th of June last, it will be seen that at that time the number of governors who had joined the Society was 186, of whom 65 were life governors, and 121 annual subscribers of 5*l.* each. That there were in addition 280 members, of whom 31 were life members and 249 annual subscribers: making a total

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* Arrangements have also since been made for opening correspondence with the foreign societies of Toulouse and Bourdeaux.

of 466. That the sum received amounted to 2526*l.* 1*s.*; and that there had been expended about 130*l.*; leaving a sum of 2396*l.* 1*s.* in the hands of the bankers, Messrs. Drummond and Co., besides a further sum of 2057*l.* due from subscribers.

At the present time the number of governors is 206, of whom 68 are life governors, and 138 annual subscribers of 5*l.* each. There are besides 484 members, of whom 46 are life members and 438 annual subscribers: making a total of 690; and exhibiting an increase of 224 since the 27th of June last.*

Your Committee have the pleasure to announce that a considerable number of new subscribers are about to join the Society; and the attention of local societies being daily more and more directed to it, a further accession of subscribers may be reckoned upon.

The sum already received for subscriptions amounts to 3739*l.*, and there has been expended 676*l.* 13*s.* 7*d.*, leaving a balance of 3062*l.* 6*s.* 5*d.* in favour of the Society, besides the further sum of 1196*l.* in the course of collection.

The income of the Society, arising from annual subscriptions, now amounts to 1128*l.* The receipts and expenditure since its establishment, as exhibited in a balance-sheet, examined and approved by your Finance Committee, is subjoined.

Your Committee cannot conclude their Report without making grateful mention of those subscribers who have kindly enabled the Society to commence the formation of a library by presenting useful works.

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* The number of governors is now 221, and of members 726; making a total of 947.

ACCOUNT OF THE RECEIPTS AND EXPENDITURE OF THE SOCIETY.

Dr.	£.	s.	d.	*Cr.*	£.	s.	d.	£.	s.	d.
To Advertisements	117	6	8	By Life Governors	2500	0	0			
Stationery	27	5	8	Governors	530	0	0			
Furniture	100	7	0	Life Members	410	0	0			
Postage	2	0	1	Members	299	0	0			
Carriage of Parcels	7	5	3					3739	0	0
Housekeeper	19	17	11	Amount over-paid				6	0	0
Lithography, Printing, &c.	75	14	6							
Books	3	3	0							
Maps	4	8	0							
Assistance in folding and delivering Prospectuses	6	10	0							
Report of Meeting on 27th of June last	2	2	0							
Expenses at Freemasons' Tavern	9	0	0							
Salaries	100	0	0							
Rent	196	17	6							
Coals	4	16	0							
Secretary, for current Expenses	50	0	0							
Amount invested in the Funds	2000	0	0							
Amount in Bankers' hands	947	14	6							
Petty Cash in Secretary's hands	70	11	11							
	£3745	0	0					£3745	0	0

QUERIES ON THE USE OF LIME AS A MANURE.

Drawn up by J. W. Childers, Esq., M.P., and adopted by the Committee of Management.

The Doncaster Agricultural Society, of which Earl Spencer was president, in the year 1828 decided on turning their attention to other subjects besides the exhibition of stock; and it occurred to them that a very desirable mode of gaining accurate information on agricultural subjects would be to draw up queries, and to send them round to farmers and others likely to give information. The substance of the answers was then embodied in a Report.

It was thought that by this means knowledge of a very valuable character might be obtained, inasmuch as it would not merely be the opinion or experiments of an individual, however talented and accurate he might be, but the combined experience of a number of persons. Thus the errors and mistakes of one could be corrected by the statements of others.

This experiment was successful and satisfactory. The Society published, in successive years, Reports on Bone Manure, on Mangel Wurzel as a Fallow Crop, and on the Turnip-Fly.

The Committee of the English Agricultural Society have decided to pursue the same plan; and it is hoped that the extent of the Society, together with its power of commanding greater editorial ability, will enable it to prosecute the system more efficiently.

The subject adopted for the first inquiry is one of very great extent (and though much has been written on it, still great doubt remains),—" The application of Lime as a Manure."

It may not perhaps be so interesting as some other subjects that might have been proposed, but, from the general diffusion of limestone all over England, it ought to excite attention in every county.

Lime is so various in its qualities, and its effects are so contradictory on different soils, that its application as a manure is as much undervalued by some as it is extolled by others.

The object being to obtain the results of experience, under the many variations of soil, climate, culture, and other circumstances which this country affords, the Committee hope that the number, as well as the accuracy, of the answers will be such as may correspond with the extent of the subject; and that active agriculturists may be disposed in this way to second the views of the Society, by assisting in the collection of authentic facts, on the due examination of which alone, agriculture, like other sciences, can be firmly established.

Queries.

1. How many years have you used lime as a manure?
2. How many acres have you limed each year?
3. What quantity have you put on per acre?
4. On what sort of soil?
5. At what time of year?
6. For what crop?
7. Whether with or without manure?
8. In what manner applied?
9. What effect on the crop?
10. What effect on the succeeding crop?
11. What was the price of the lime?
12. Do you continue to use it?
13. What is the chemical description of lime you use?
14. State generally any particulars with respect to lime.

Normal Experiment on the Comparative Effect of different Manures upon Turnips, &c.; and on the Comparative Yield of different Turnips, under similar Dressings.

	Swedes.	Aberdeen Yellows.	Mangle Wurzel.	Globes.	Tankards	Any other Turnips.
Bones 10 bushels						
Bones 20 bushels						
Bones 30 bushels						
No Manure . . .						
Rape Dust. . . .						
Dung						
Any other Manure						

Each compartment to consist of one quarter or one half of an acre.

Members of the Society are earnestly requested to further its objects by causing this experiment to be tried on their own farms, and by sending an accurate account of the weight of the crop to the Secretary, with a statement of the previous cropping, soil, and subsoil.

These accounts will be compared, and the principal points published. The value of the result will obviously depend on the number of the experiments, and on the accurracy with which they are stated.

ENGLISH AGRICULTURAL SOCIETY.

RULES.

1. The English Agricultural Society consists of a President, twelve Trustees, twelve Vice-Presidents, Governors, and Members.

2. The President is annually elected, and is not re-eligible for three years.

3. The President, Trustees, and Vice-Presidents, are elected from the Governors.

4. The Governors pay 5*l.* annually, the members 1*l.*, with the power to compound for life by the payment in one sum of ten annual subscriptions.

5. The Committee of Management consists of the President, Trustees, Vice-Presidents, and fifty Subscribers; twenty-five of whom go out annually by rotation, but may be re-elected.

6. The Committee have the power of appointing sub-committees of any subscribers to the Society, of all which sub-committees, the President, Trustees, and Vice-Presidents are members *ex officio.*

7. One general annual meeting will be held every year in London, in the month of May; and one in the country, in the months of July or August.

8. The Committee and all the officers are elected at the annual meeting in London, but do not enter upon the duties of their respective offices until after the annual meeting in the country.

9. All governors and honorary members have the power of attending meetings of the committee, but have not the privilege of voting unless forming part of that committee.

10. Every candidate for admission into the Society as governor or member must be proposed by a subscriber. The proposer to specify in writing the name, rank, and usual place of residence of the candidate; and every such proposal to be read at the first meeting of the committee next after such candidate shall have been proposed, and every such candidate to be eligible at the then succeeding meeting.

11. No subscriber shall enjoy the privileges of the Society or attend the meetings, whose subscription shall be in arrear.

12. The Committee of Management will meet every Wednesday at twelve o'clock for the discharge of business, three to be a quorum; but no grant of money shall be made at any such meeting, nor shall any business of importance be considered as fully decided upon until confirmed at a subsequent monthly meeting.

13. The meeting on the first Wednesday in every month shall be the monthly meeting, five to be a quorum, when the general business of the Society shall be transacted, grants of money made, reports of sub-committees considered and confirmed, if approved.

14. At all meetings of the committee when the quorum is assembled

in the absence of the President, the Trustee, or Vice-President of the highest rank shall take the chair, if no Trustee or Vice-President be present. The meeting will elect their chairman.

15. The first business at each meeting of the committee to be the reading of the minutes of the preceding meeting.

16. In case of an equality of votes, the question to be decided by the casting vote of the chairman.

17. All drafts for money shall be signed by the chairman of the committee and countersigned by one of the Trustees and the Secretary, but only on the recommendation of the Committee of Finance.

18. The Committee may at any monthly meeting discontinue the weekly meetings of the Committee for any period not exceeding two months.

19. No prizes shall be allotted except at the monthly meetings in May, June, and July.

20. No rule or bye-law shall be altered unless due notice of such change shall be given at a meeting of the Committee, and carried at the two subsequent monthly meetings.

21. Subscriptions are paid in advance, and are due on January 1st; but subscribers elected in December are liable only for the year ensuing.

22. It is a fundamental rule of the Society, that no question shall be discussed, at any of its meetings, of a political tendency, or which shall refer to any matter to be brought forward or pending in either of the Houses of Parliament.

RULES OF COMPETITION FOR PRIZES.

1. That all information contained in prize essays shall be founded on experience or observation, and not on simple reference to books, or other sources.

2. That drawings, specimens, or models shall accompany writings requiring them.

3. That all competitors shall transmit a sealed note, containing their names and addresses, with a motto on it to correspond with one inscribed on the essay.

4. That the Society shall have the power to publish the whole or any part of the essays which gain the prizes, and the other essays will be returned on the application of the writers.

5. That the Society is not bound to give an award, unless they consider one of the essays worthy of a prize.

6. That, in all reports of experiments, the expenses shall be accurately detailed.

7. That only the imperial weights and measures are those by which calculations are to be made.

8. That no prize be given for any essay which has been already in print.

9. That prizes may be taken in money or plate at the option of the successful candidate.

All Essays must be sent to the Secretary, 5, Cavendish Square.

ESSAYS AND REPORTS ON VARIOUS SUBJECTS.

ESSAYS FOR THE MEETING IN 1839.

1. DRAWING TURNIPS.

Ten Sovereigns will be given for the best account of the advantages of drawing Turnips from the Land, and consuming them in Houses or Yards.

Competitors must state—

1. The best mode of drawing and carrying turnips both from light and heavy soils.
2. The means of avoiding any injury to the future crops from cutting up the land in carting, more particularly in clay soils.
3. The best mode of supplying the loss of manure arising by the turnips not being consumed on the land.
4. The comparative progress of stock in fattening or thriving, when consuming drawn turnips or those still on the land.
5. The comparative quantity or quality of the manure in either of the above modes.
6. The expense of drawing.

2. WHEEL AND SWING PLOUGHS.

Ten Sovereigns will be given for the best Essay on the comparative advantages of Wheel and Swing Ploughs.

3. WATER-MEADOWS.

The Society's Gold Medal will be given for the best account of the formation and management of Water-meadows, founded on actual experience.

Competitors must give—

1. A description of the water and its qualities.
2. The means by which it has been collected and brought to the meadow.
3. The quantity and quality of the grass mown, and the purposes for which used.
4. The amount of stock (if any) depastured, and at what time of the year.
5. The botanical and common names of the grass growing.
6. The expense of formation and management.

The size of the water-meadows described must be not less than five acres.

4. VARIETIES OF WHEAT.

Twenty Sovereigns will be given for the best account of the most approved varieties of Wheat hitherto introduced into England.

Competitors must state—

1. The mode of procuring the sorts of wheat described.
2. Their culture, viz., preparation and quantity of the seed; time and method of sowing; relation both as to preceding and following crops, and as to varieties of soil.
3. Hardihood and power to withstand severe winters.
4. Early maturity and time of severance of crops.
5. Tendency to degenerate, and liabilities to disease.
6. Amount of produce in grain, chaff, and straw, and the relative quantities and qualities of flour and offal.

5. KEEP OF FARM HORSES.

Twenty Sovereigns will be given for the best account of the cheapest way of keeping Farm Horses, both in Winter and Summer.

Competitors must state—

1. The quantity of food given, and the average price or value of such food.
2. The work performed by the horses.
3. The length of time they have been kept on the food described;
4. And whether kept in yards, or stables, or in pastures.

6. RURAL ECONOMY ABROAD.

The Society's Gold Medal and Twenty-five Sovereigns will be given for the best account of Rural Economy abroad.

7. STALL-FEEDING CATTLE.

Twenty Sovereigns will be given for the best account of Stall-feeding Cattle.

8. WINTER AND SUMMER MANURE.

Ten Sovereigns will be given for the best account founded on actual experiment of the comparative qualities of Winter and Summer-made Manure.

Competitors must state—

1. The comparative value of fold-yard manure made from green food and litter during the summer months, or that produced by roots and litter during the winter, in strength, richness, and durability with reference to the crops to which they are respectively applied.
2. The general economy of the respective processes.

9. LIQUID MANURE.

Ten Sovereigns will be given for the best account of Liquid Manure.

10. COMPOST HEAPS.

Ten Sovereigns will be given for the best mode of making Compost Heaps.

These Essays must be sent in to the Secretary, on or before March 1st, 1839.

ESSAYS FOR THE MEETING IN 1840.

1. STORING TURNIPS.

Ten Sovereigns will be given for an account, founded on experience, of the best mode of Storing Turnips, by which they may be preserved in their natural state till the April or May succeeding the time of their being taken up.

Competitors are required to state—

1. Their experience of the methods now in practice for Storing Turnips, viz., on the surface of the soil, in pits, in sheds, or in houses.
2. The different sorts of covering, and their thickness.
3. The depth of pits.
4. The relative keeping virtues of different species, whether of Swedes or of common turnips.
5. The best modes of taking up and cleaning, with reference to their preservation.
6. Any new methods recommended.

2. ADMIXTURE OF SOILS.

Twenty Sovereigns will be given for the best account of the Transposition and Admixture of Soils, as in the application of a clay dressing to a light sand.

Competitors must state the results of actual experiments.

3. EARLY SPRING FEED.

Twenty Pounds will be given for the best Essay on the Grasses and Leguminous Plants best adapted to arable cultivation for early feed in the spring.

The points of comparison to which the Society would wish the attention of competitors for this prize to be mainly directed are the following—

1. Earliness of vegetation.
2. Power of resisting severe frost.
3. Abundance of produce.
4. Nutritive quality.
5. Effect on the soil and on the succeeding crop.
6. The method of cultivation.

The species or variety of the plants sown should be accurately designated, and also the quality of the soil on which they have been grown.

4. INSECTS INJURIOUS TO CEREAL CROPS.

Twenty Pounds will be given for the best account of the Insects prejudicial to the Cereal Crops :—viz., wheat, barley, oats, and rye, in their different stages of growth. The descriptions of the insects must be entomological, and any remedies proposed must be the result of actual experiment.

5. PLANTATIONS.

The Gold Medal will be given for the best account of the forest trees, best fitted for plantations in England.

Competitors must state—

1. The trees best suited to various soils of inferior description, distinguishing each sort as clay, peat, chalk, sand.
2. Whether the trees should be mixed together or in separate masses.
3. The best mode of planting, and expense.

6. UNDERWOOD.

The Gold Medal will be given for the best account of the Cultivation and Management of Underwood founded upon actual experiment.

Competitors are required to state—

1. The nature of the soil, and when it has been recently planted, the mode of preparing it.
2. The average number of plants per acre.
3. The description of underwood growing.
4. The best sorts to be planted.
5. The cost of fencing and draining.
6. The comparative produce of not less than five acres under the common, and under an improved system of management.

7. ROTATION AND CROPS.

Ten Sovereigns will be given for an account of the Rotation of Crops est suited to heavy lands.

The object of this inquiry will be, the combination, within a given period, of the greatest number of crops, including winter and half-crops consumed before they arrive at maturity, with profitable return, and with improvement of the condition of the soil.

8. WEEDS IN MEADOWS.

Twenty Sovereigns will be given for the best account of the Weeds in Meadows and Pastures.

Competitors must state—

1. What weeds are found in old pastures and in newly laid down grasses respectively.
2. The effect of these weeds on the animals who feed on them.
3. More particularly the effect on the milk of cows, and on the butter and cheese produced from that milk.
4. The comparative value of the butter and cheese from pastures and artificial grasses infested with weeds, and from those which are clear of them.
5. The best mode of eradicating such weeds from pastures, from meadows and from artificial grasses.

9. GYPSUM AS A MANURE.

Ten Sovereigns will be given for the best account of the application of Gypsum as a Manure to artificial Grasses; stating—

1. The period and mode of application.
2. The state of the crop and nature of the grass.
3. The comparative produce of crops to which gypsum has, and has not, been applied.

10. DISEASES OF WHEAT.

Fifteen Sovereigns will be given for the best Essay on Smut, Mildew, and Diseases affecting the Crop in its more advanced stages.

1. How far derivable from internal or external causes.
2. First intimation of their presence, under what circumstances, and in what soils they are most prevalent.
3. How far prevented by preparation of soil or seed.
4. What treatment is recommended to arrest their progress.

These Essays must be sent in to the Secretary on or before March 1, 1840.

AGRICULTURAL IMPLEMENTS.

1. DRAINING PLOUGH.

Fifty Sovereigns will be given for a Plough which shall have been proved, to the satisfaction of the Society, to be adapted for the cheap and effectual cutting of Drains intended to be constructed with tiles, stones, or other materials with the least injury to the neighbouring surface of the field. This prize will be awarded in 1839.

2. GORSE CRUSHING MACHINE.

Twenty Sovereigns will be given for the cheapest and most effective Gorse Crushing Machine.

1. The machine produced must be on a working scale, and at a cost that will be attainable by the occupiers of the smallest farms.
2. It must be capable of reducing the material to a pulpy state for the mastication of ruminating animals, as cows and sheep: this prize will be awarded in 1840.

3. ANY IMPLEMENT.

For the invention of any new Agricultural Implement, such sum as the Society may think proper to award.

AGRICULTURAL OPERATIONS.

SUBSOIL PLOUGH.

Twenty Sovereigns will be given for the most satisfactory application of the Subsoil Plough to the improvement of land, whether for the purpose of correcting excessive moisture or dryness of soil.

The Society will require from competitors—

1. An accurate description of the plough used.
2. Of the quality and state of soil and subsoil, with an estimate of its annual value before the commencement of the operation.
3. An account of the drains cut (if any) their depth and distance from each other.

4. A detailed statement of the subsoil and other ploughings to which the grounds have been subjected.
5. An account of any manure expended.
6. Of the bulk of produce of each crop.
7. Of the total expense of the operation so far as it has proceeded, and
8. An authentic estimate of the improved value of the land resulting therefrom: this prize will be awarded in 1840.

2. SUBSOIL AND TRENCH PLOUGHING.

Twenty Sovereigns will be given for the most satisfactory experiment on the comparative merits of Subsoil and Trench Ploughing.

The same conditions apply to this prize as to that which immediately precedes it. It is only necessary further to state that as the object of the Society is to ascertain, as far as possible, the advantages of the two processes, namely, subsoil ploughing, in which the subsoil is divided by the plough but left in its original situation, and trench ploughing, in which the subsoil is not only divided, but is also brought to the surface; they strongly recommend to competitors that the two processes should be conducted on a piece of ground fairly divided into two lots, of equal quality, and that the drains cut in each lot, as well as any assistance afforded by manure, should be similar on each of the lots: this prize will be awarded in 1841.

CATTLE.

Prizes for Improving the Breed of Cattle.

Class I.—Short-Horns.

1. To the owner of the best Bull . . . Thirty Sovereigns.
2. To the owner of the best Cow in milk . . Fifteen Sovereigns,
3. To the owner of the best in-calf Heifer, not exceeding three years old . . . . . Fifteen Sovereigns.
4. To the owner of the best Yearling Heifer . Ten Sovereigns.
5. To the owner of the best Bull Calf . . . Ten Sovereigns.

Class II.—Herefords.

1. To the owner of the best Bull . . . Thirty Sovereigns.
2. To the owner of the best Cow in milk . . Fifteen Sovereigns.
3. To the owner of the best in-calf Heifer, not exceeding three years old . . . . . Fifteen Sovereigns.
4. To the owner of the best Yearling Heifer . Ten Sovereigns.
5. To the owner of the best Bull Calf . . Ten Sovereigns.

Class III.—Devons.

1. To the owner of the best Bull . . . Thirty Sovereigns.
2. To the owner of the best Cow in milk . . Fifteen Sovereigns.
3. To the owner of the best in-calf Heifer, not exceeding three years old . . . . . Fifteen Sovereigns.
4. To the owner of the best Yearling Heifer . Ten Sovereigns.
5. To the owner of the best Bull Calf . . Ten Sovereigns.

Class IV.—Cattle of any Breed, or Cross,

not qualified for the foregoing Classes.

1. To the owner of the best Bull . . .	Thirty Sovereigns.
2. To the owner of the best Cow in milk . .	Fifteen Sovereigns.
3 To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
4. To the owner of the best Yearling Heifer .	Ten Sovereigns.
5. To the owner of the best Bull Calf . .	Ten Sovereigns.

Class V.—Cattle for Dairy Purposes.

1. To the owner of the best Cow in milk, which shall, in the opinion of the Judges, be best calculated for dairy purposes . . .	Fifteen Sovereigns.
To the owner of the second best Cow . . .	Ten Sovereigns.

N.B.—In awarding these Prizes the Judges will be requested to take into their consideration not only the quantity and quality of the milk which the cow gives, but also her value to feed after she shall have been dried.

Class VI.—Oxen.

1. To the owner of the five Oxen bought since the 1st of September, 1838, likely to weigh more than 70 stone at Christmas, 1839, which in the opinion of the Judges will pay best for grazing	Twenty Sovereigns.
2. To th eowner of the five Oxen bought since the 1st of September, 1838, not likely to exceed 70 stone weight at Christmas, 1839, which in the opinion of the Judges will pay best for grazing	Twenty Sovereigns.

Class VII.—Horses.

1. To the owner of the best Cart Stallion . .	Twenty Sovereigns.
2. To the owner of the best Cart Mare and Foal.	Ten Sovereigns.
3. To the owner of the best Stallion for breeding hunters, carriage-horses, or roadsters, which shall have served mares during the season of 1839, at a price not exceeding 3*l.* each .	Thirty Sovereigns.

SHEEP.

Prizes for Improving the Breed of Sheep.

Class VIII.—Leicester.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second best ditto . . .	Ten Sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

Class IX.—South Downs, or other short-wooled Sheep.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second best ditto . .	Ten Sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

Class X.—Long-woolled Sheep,

not qualified to compete for Class VIII.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second best ditto . . .	Ten sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

N.B.—The Sheep exhibited for any of the above Prizes must not be shorn before the 1st of May, nor after the 1st July, 1839.

Class XI.—Pigs.

1. To the owner of the best Boar . . .	Ten Sovereigns.
2. To the owner of the best Sow	Five Sovereigns.
3. To the owner of the best pen of 3 Pigs of the same litter, above 4 and under 9 months old.	Ten Sovereigns.

Class XII.—Extra Stock, Implements, Roots, and Seeds.

For Extra Stock of any kind, not shown for any of the above Prizes, and for Implements, Roots, Seeds, &c., Prizes will be awarded and apportioned, by the Committee and Judges, to the value, in the whole, of	Fifty Sovereigns.

SEED WHEAT.

To the Exhibitor at the Oxford Meeting of the best 12 bushels of White Wheat, of the harvest of 1838, grown by himself	Fifty Sovereigns.
To the Exhibitor at the Oxford Meeting of the best 12 bushels of Red Wheat, of the harvest of 1838, grown by himself. . . .	Fifty Sovereigns.

N.B.—These Prizes will be awarded at the General Meeting in December, 1841.

The two best samples, without distinguishing between the two, will be selected by Judges appointed at the Oxford Meeting, and will be sown in the Autumn of 1839, by three farmers, under the direction of the English Agricultural Society, who will make their Report, upon which the Prize will be awarded. Ten Sovereigns will be given to the Exhibitor of the

one of these two samples who shall not obtain the Prize, or, if from the produce when sown neither of the two shall appear to deserve a Prize, Ten Sovereigns will be given to the Exhibitors of each.

GENERAL REGULATIONS.

No Stock can be admitted for exhibition unless the necessary Certificates, in the form prescribed, and signed by the Exhibitor in the manner directed, be delivered to the Secretary, or sent post paid, so as to reach the Society's Rooms, 5, Cavendish-square, on or before the 1st July next.

The name and residence of the Breeders of all animals exhibited, when known, should be stated.

Non-Subscribers to pay five shillings for every head or lot of live stock before obtaining a ticket of permission to bring their cattle into the Show-yard.

The same animal cannot be entered for two classes.

The age of animals, in all cases, to be computed from the day of birth.

The sheep exhibited for any of the prizes must not be shorn before the 1st May, nor after the 1st July, 1839.

Persons intending to exhibit Extra Stock must give notice to the Secretary, on or before the 1st July next.

Stock of every description must be in the Show-yard before Eight o'clock on Tuesday morning, 16th July, and will remain in the charge of the Society until four o'clock on Wednesday afternoon.

No animal can be removed during the Show without leave.

Whenever reference is made to weights or measures, it is to be considered that the Imperial weights and measures are alone referred to.

Persons intending to exhibit Implements, Roots, Seeds, &c., must give notice of their intention to the Secretary; and furnish him with a description, on or before the 10th of July; and all such Implements, Roots, Seeds, &c., must be brought to the Show-yard on Monday, 15th July.

Persons wishing to enter into any Sweepstakes should apprize the Secretary of their intention.

FORMS OF CERTIFICATES.

The subjoined Forms of Certificates, adapted to the animals in each class, must be used by the Candidates intending to exhibit Cattle, Horses, Sheep, or Pigs, at the Oxford Meeting in July, 1839; and must be delivered to the Secretary, on or before the 1st July. The Certificates used must be procured from the Secretary, and if by letter, post paid.

CATTLE.

For Bulls in Classes, 1, 2, 3, *and* 4.

I, , of , in the County of , do hereby certify that the Bull to be exhibited by me for the 1st Prize in Class is of the breed, is not more than years and months old, and is my own property.

N.B. The name and residence of the Breeder, if known, should be stated.

For Cows in Milk, in Classes 1, 2, 3, *and* 4.

I, , of , in the County of , do hereby certify that the Cow to be exhibited by me for the 2nd Prize in Class is of the breed, will, on the 17th July, be not more than years and months old, had a live Calf on the day of last, and is my own property.

N.B. The name and residence of the Breeder, if known, should be stated.

For in-calf Heifers in Classes 1, 2, 3, *and* 4.

I, , of , in the County of , do hereby certify, that the Heifer to be exhibited by me for the 3rd Prize in Class is of the breed, will, on the 17th July, be not more than years and months old, was bulled before the 10th of May, 1839, has not been bulling since that day, and is my own property.

N.B. The name and residence of the Breeder, if known, should be stated.
The Prizes for in-calf Heifers will not be paid until they have calved.

For Yearling Heifers, in Classes 1, 2, 3, *and* 4.

I, , of , in the County of , do hereby certify, that the Yearling Heifer, to be exhibited by me for the 4th Prize in Class is of the breed, will, on the 17th July, be not more than one year and months old, and is my own property.

N.B. The name and residence of the Breeder, if known, should be stated.

For Bull Calves in Classes 1, 2, 3, *and* 4.

I, , of , in the County of , do hereby certify, that the Bull Calf, to be exhibited by me for the 5th Prize in Class is of the breed, will, on the 17th July, be not more than months old, and is my own property.

N.B. It is desirable that the day of birth, if known, should be stated.

For Cows in Milk, Class 5.

I, , of , in the County of , do hereby certify that the Cow to be exhibited by me for the Prize in Class 5, will, on the 17th July, be not more than years and months old, had a Calf on the day of last, and is my own property.

N.B. The name and residence of the Breeder, if known, should be stated.

For Oxen in Class 6.

I, , of , in the County of , do hereby certify, that I bought the five Oxen, to be exhibited by me for the Prize in Class 6, of Mr. , at , in the County of , in the month of 1838, and that they are my own property.

N.B. The name and residence of the Breeder, if known, should be stated.

HORSES IN CLASS 7.

For a Cart Stallion.

I, , of , in the County of , do hereby certify that the Cart Stallion to be exhibited by me for the 1st Prize in Class 7, is not more than years old, and is my own property.

For a Cart-Mare and Foal, in Class 7.

I, of , in the County of , do hereby certify, that the Cart Mare and Foal, to be exhibited by me for the 2nd Prize in Class 7, is my own property, and that the Foal is the offspring of the Mare.

N.B. The name of the person to whom the Sire of the Foal belonged should be stated, if known.

For Stallions for Breeding Hunters, &c., in Class 7.

I, , of , in the County of , do hereby certify, that the Stallion, to be exhibited by me for the 3rd Prize in Class 7, has served Mares in the County of , during the season of 1839, at a price not exceeding 3*l.* for each Mare, is not more than years old, and is my own property.

SHEEP.

For Shearling Rams, in Classes 8, 9, *and* 10.

I, , of , in the County of , do hereby certify, that the Shearling Ram, to be exhibited by me for the 1st Prize in Class , is of the breed, was not shorn before the 1st May, nor after the 1st July, 1839, and is my own property.

For Rams of any age, in Classes 8, 9, *and* 10.

I, , of , in the County of , do hereby certify that the Ram to be exhibited by me for the 2nd Prize in Class , is of the breed, will, on the 17th July, be not more than years old, was not shorn before the 1st May, nor after the 1st June, 1839, and is my own property.

For Ewes with their Lambs, in Classes 8, 9, *and* 10.

I, , of , in the County of , do hereby certify, that the Pen of 5 Ewes, with their Lambs, to be exhibited by me for the 3rd Prize in Class , are of the breed, and all of the same flock, that they were not shorn before the 1st May, nor after the 1st July, 1839, that the Lambs are the offspring of the Ewes respectively, and are my own property.

It is desirable that the flock from which they are obtained should be stated if known.

For Shearling Ewes, in Classes 8 *and* 9.

I, , of , in the County of , do hereby certify, that the Pen of 5 Shearling Ewes, to be exhibited by me for the 4th Prize in Class , are of the breed, all of the same flock, were not shorn before the 1st May, nor after the 1st July, 1839, and are my own property.

FOR PIGS IN CLASS 11.

For a Boar.

I, , of , in the County of , do hereby certify, that the Boar, to be exhibited by me for the 1st Prize in Class 11, is my own property.

For a Sow.

I, , of , in the County of , do hereby certify, that the Sow, to be exhibited by me for the 2nd Prize in Class 11, is my own property.

For a Pen of 3 *Pigs.*

I, , of , in the County of , do hereby certify, that the 3 Pigs, to be exhibited by me for the 3rd Prize in Class 11, are all of one litter, will, on the 17th July, be not more than weeks old, and are my own property.

SEED-WHEAT CERTIFICATE.

I, of , in the county of , do hereby certify, that the 12 bushels of Wheat, to be exhibited by me, were grown in the year 1838, on a soil, on the farm of , at , in the County of . The seed of which was obtained from Mr. , and was called

N.B. It would be desirable that any other particulars as to the preceding crop, the manner of sowing, and the quantity and sort of manure used, should be stated. This Certificate must be sent to the Society on or before the 10th of July.

The following declaration, in the hand-writing of the Exhibitor, must be added at the foot of each Certificate :—

I believe the contents of this Certificate to be true. A—— B——

SWEEPSTAKES.

The following Sweepstakes are open to be decided at the Annual Meeting of The English Agricultural Society at Oxford, by the Judges appointed to decide on the Stock shown for the Prizes offered; all the Stakes to close on the 24th June. The ages of the animals to be computed to the day of showing. The Stakes to be paid to the Secretary, on or before the 24th of June.

Any persons wishing to have their names added as subscribers to any one of the Stakes, or to open a fresh one for any kind of stock, will please to give notice to the Secretary.

For the five best Ram Lambs, under seven months old, fed on hay and green food only .	Two Sovereigns each.
For the best two Fleeces of Teg Wool, shorn from Shearling Ewes, which have been folded constantly, and the property of a tenant . .	Two Sovereigns each.
For the best Shearling Leicester Ram . . .	Three Sovereigns each.
For the two best Fat Sheep, not being rams .	Three Sovereigns each.
For the best Short-wool led Shearling Ram .	Ten Sovereigns each.
For the best five Short-wool led Maiden Ewes .	Ten Sovereigns each.

N.B. The fleeces of the sheep exhibited for these Sweepstakes must be produced, and, if required, sworn to as belonging to the sheep exhibited; and the Judges will be requested to take into consideration the value of the fleece, as forming part of the value of the animal. Cross-bred sheep are admissible.

For the best Devon Bull . . . . Ten Sovereigns each.

For the best Boar . . . . Ten Sovereigns each.

In the four last-named Sweepstakes size not to be considered conclusive of merit.

For an Ox, under five years old, fed on hay and green food only, previous to Christmas, 1838. Five Sovereigns each.

For an Ox, under four years old, fed on hay and green food only, previous to Christmas, 1838. Five Sovereigns each.

N.B. A statement of the age and manner of feeding the oxen, in the two preceding Sweepstakes, to be given to the Secretary at the time of delivering the other certificates.

A Sale by Auction, of Horses, Beasts, and Sheep, will take place on the day after the Show.

Arrangements will be made for an Agricultural Dinner, on an extensive scale, on the 17th July, the day of the Show.

DONATIONS OF BOOKS.

Titles of Books.	*Donors.*
Practical Farming and Grazing, by C. Hillyard, Esq. 12mo. Northampton, 1837.	C. Hillyard, Esq.
Letter on the formation of a National Agricultural Institution. 8vo. By Henry Handley, Esq., M.P.	H. Handley, Esq., M.P.
Thoughts on Improving Agriculture	Mr. Hawkins.
British Husbandry, published by the Society for the Diffusion of Useful Knowledge. 2 vols. 8vo.	French Burke, Esq.
The Farmer's Annual Account Book. 4to. 1838.	
———— Manual	
———— Magazine, 9 vols. 8vo. Edited by Wm. Shaw	Wm. Shaw, Esq.
Stable Economy, by John Stewart. 12mo. Glasgow, 1838.	
Elements of Practical Agriculture, by Professor Low. 8vo. Edinburgh, 1838	
Advice to Purchasers of Horses, by J. Stewart. 12mo. Glasgow, 1837	
Veterinary Tablet, by Matthew Small. 12mo	
The Veterinarian. 10 vols. 8vo. Edited by W. Youatt, Esq.	Wm. Youatt, Esq.
The Horse, The Sheep, British Cattle — 3 vols. 8vo. Published by the Society for the Diffusion of Useful Knowledge	
The Hop Farmer, by E. I. Lance. 12mo.	Mr. Lance.
The Scriptural Code of Health, by C. Whitlaw. 12mo. 1838	Mr. C. Whitlaw.
Principles of Agriculture, by W. Bland. 12mo. 1827	W. Bland, Jun.
Essay on the Uses of Salt for Agricultural Purposes. By C. W. Johnson, Esq. 8vo.	C. W. Johnson, Esq.
—— on Liquid Manure. By C. W. Johnson, Esq. 8vo.	
—— on the Use of Crushed Bones for Manure. By C. W. Johnson, Esq. 8vo.	
—— on the Advantages of Railways to Agriculture. By G. W. Johnson, Esq. 8vo.	
History of English Gardening, 8vo. By G. W. Johnson, Esq. London, 1829	
Observations on the Employment of Salt in Agriculture, &c. London. 8vo. By C. W. Johnson.	
Lectures on Agricultural Chemistry, by Sir H. Davy. 8vo.	The Duke of Richmond.
Agriculture of England, Wales, and Scotland, communicated to the Board of Agriculture. 8 vols. 4to.	Rev. W. L. Rham.

Titles of Books.	*Donors.*
Communications to the Board of Agriculture. 7 vols. 8vo. Ditto, New Series, part I. vol. 1. Lords' Report on the Corn Laws. 1813-14. Commons' Report on the Corn Laws. 1814. Surveys of the following counties:— Middlesex—Devonshire—Leicester and Rutland—Bedfordshire—Sussex—East Riding of Yorkshire—Kent—Berkshire—Gloucestershire—Banffshire—Stirlingshire — Dumfriesshire—Renfrewshire—Invernesshire—Sutherland—Isle of Man	John Hall, Esq.
Bulletin de la Classe D'Agriculture de la Société des Arts de Geneve. 118 Numbers, to June, 1838. Geneva	M. Fazey, President of the Agricultural Society at Geneva.
Observations Pratiques, sur la Culture du Pin Maritime dans le Département de la Sarthe. Par Marcellin Vétillart	Marcellin Vetillart.
De la Stabulation Permanente. Par J. C. Favre D'Evires. Lyon, 1834 Annales de Sciences Physiques et Naturelles D'Agriculture et D'Industrie; publiées par La Société Royale D'Agriculture, etc. de Lyon. Lyon. Tome 1	La Societe Royale D'Agriculture, etc. de Lyon.
The Agriculturalist's Manual. 8vo. By Peter Lawson and Son. Edinburgh, 1836	C. Lawson, Esq.
Report of the Committee of the Doncaster Agricultural Association on the "Turnip Fly." 8vo. 1834 Report of the Committee of the Doncaster Agricultural Association on "Bone Manure." 8vo. 1834	J. W. Childers, Esq., M.P.

LIST OF GOVERNORS.

[Life Governors are distinguished by a mark thus. †]

Names.	Town Residence.	Country Residence.
†Acland, Sir T. D. Bart., M.P.	10, Upp Harley-st.	Killerton, Devon.
Adeane, H. John	48, Harley-street .	Babraham House, Cambridge.
Alston, Rowland, M.P. . .		Pishiobury, Sawbridgeworth.
Alston, R. Gardiner . . .	Ditto	Ditto, ditto.
Amherst, Earl	66, Grosvenor-st. .	Montreal, Seven Oaks, Kent.
†Angerstein, John	23, St. James's-sq.	Weeting Hall, Norfolk.
Antrobus, Sir E., Bart. . .	146, Piccadilly . .	Amesbury Abbey, Salisbury.
†Arcedeckne, E.	1, Grosvenor-sq .	Glevering Hall, Suffolk.
Bagge, W., M.P. . . .	Carlton-club . .	Stradset Hall, Norfolk.
Baker, T. J. Lloyd . . .	. .	Hardwicke Court, Gloucester.
†Barclay, Charles	43, Grosvenor-pl. .	Bury Hill, Dorking, Surrey.
†Barclay, David	8 Belgrave-square	
†Baring Hon. W. B., M.P . .	12, Gt. Stanhope-st.	
Baring, Sir Thos., Bart. . .	21, Devonshire-pl.	Stratton Park, Winchester.
Barker, Thos. Raymond . .	. .	Hambleden, Henley-on-Th.
Barker, John Raymond . .	. .	Fairford Park, Glostershire.
†Barneby, John, M.P. . . .	38, St. James's-pl.	Brockhampton Hse, Worster.
Bedford, The Duke of. . .	6, Belgrave-square.	Woburn, Beds.
Benett, John, M.P. . . .	Limmer's Hotel	Pyt House, Hindon, Wilts.
Bevell, J.	. .	
Bisshopp, James	. .	
Blachford, Fitz Roy . . .	. .	Osborn, Cowes, Isle of Wight.
Blake, William	62, Portland-place	Danesbury, Welwyn, Herts.
†Blanshard, Henry . . .	37, Gt. Ormond-st.	
Blount, William	12, Cumberland-st.	
Bonsor, Joseph	. .	Pollesden, Surrey.
†Bowes, J., M.P	26, Charles-street .	Streatham Castle, Durham.
Bramston, T. W., M.P. . .	41, Jermyn-street .	Skreens, Chelmsford, Essex.
Braybrooke, Lord	10, NwBurlingtn-st	Audley-End, Essex.
Bridport, Lord	12, Wimpole-st. .	Cricket Lodge, Chard, Som.
Bruges, W. H. L., M.P. . .	3, Suffolk-street. .	Devizes.
†Buller, E., M.P.	5, Suffolk-place . .	Dilhorn Castle, Cheadel, Staf.
Buller, T. Wentworth. . .	37, Bryanston-sq .	
Bulteel, John	9, Grafton-street .	Ermebridge, Devon.
†Bunbury, Sir H., Bart. . .	. .	Barton, Suffolk.
Burrell, Sir C. M., Bart., M.P.	5, Richmond-ter. .	Knepp Castle, Horsham, Sus.
Burlington, Earl of, F.R.S. .	10, Belgrave-sq. .	Holker Hall, nr. Milnthorpe, Westmoreland.
†Cambridge, His R. H. The Duke of	Piccadilly.	
†Cavendish, Hon. C. C., M.P. .	49, Ditto . . .	Latimers, Chesham, Bucks
Cayley, Sir G., Bart. . . .	48, Albermarle-st.	Brompton, nr Pickering, York.
Challoner, Colonel . . .	29, Portman-square	Portnall Park, Virginia Water

Names.	Town Residence.	Country Residence.
Chichester, Earl of	17, Stratton-street.	Stanmer Park, Lewes, Sussex
†Childers, J. W., M.P.	40, Eaton-place	Cantley Hall, Doncaster
†Christopher, R. A., M.P.	97, Eaton-square	Bloxham Hall, Sleaford, Linc
Clay, W., M.P.	7, Nottingham-pl	Fullwell Lodge, Twickenham
Clifford, Charles T.		
†Clive, Hon. R., M.P.	53, Grosvenor-st.	Oakley Park, Ludlow, Salop
Cook, William	Clapham Rise	
†Copeland, Alderman, M.P.	37, Linc.-inn-fields	Lee House, Littlebury, Essex
Cotes, John		
Crawley, Samuel, M.P.	59, Portland-place	Woodcote, Shiffnell, Salop
Crompton, Sir S., Bt., M.P.	28, Hereford-street	Stockwood, Luton, Bedsh.
Crowdy, James		Woodend, Thirsk, Yorkshire
Curteis, E. B.		Highworth, Gloucestershire
Curtis, W.		Windmill Hill, nr Rye, Sussex
Dacre, Lord	2, Chesterfield-st.	
†Davenport, E. D.	28, Lower Brook-st.	The Hoo, nr Welyn, Herts.
De Beauvoir, R. B.	34, Grosvenor-sq.	Calveley, Taporley, Cheshire
Denison, J. E.		Englefield House, Reading
Denison, W. J., M.P.	90, Pall Mall	Assington, Tuxford
Dickinson, F. H.		Denbies, Dorking, Surrey
Downshire, Marquis of	21, Hanover-sq.	King's Weston, Somerset
Drummond, George	11, Wilton-crescent	East Hempstead Park, Berks.
Drummond, A. M.	Charing Cross	
Duffield, Thomas, M.P.	7, Suffolk-street	
Dugdale, Wm. S., M.P.	11, Grafton-street	Marcham Park, Abingdon
Duncombe, Hon. W., M.P.	British Hotel	Blythe Hall, Coles Hill, War. Hooton Pagnell, Doncaster
†Egerton, T. Wilbraham	7, St. James's-sq.	Tatton Park, Knutsford, Ches.
Eliot, Lord, M.P.	47, Dover-street	Port Elliot, Cornwall
Essex, Earl of	9, Belgrave-square	Cassiobury Park, Watford
Estcourt, T. H. S. B., M.P.	58, Grosvenor-st.	New Park, Devizes, Wiltsh.
Estcourt, T. G., M.P.	Batt's Hotel	Estcourt, nr Tetbury
†Etwall, Ralph, M.P.	Oxon. & Cam. Club	Andover, Hants
Euston, Earl of, M.P.	7, Grosvenor-place	Salcey Forest, Northampsh.
Evans, W., M.P.	8, Knightsbrdg-ter.	Allestree Hall, nr Derby
†Exeter, The Marquis of	Gliddon's Hotel	Burghley House, nr Stamford
Farquharson, J. J.		Langton, Blandford, Dorset.
Fellows, E., M.P.	5, Lwr Berkeley-st.	Ramsay Abbey, Huntingsh.
†Fitzwilliam, Earl, F.R.S.	Mortimer House	Milton, Peterborough
Flounders, B.		Yarm, Yorkshire
Foley, J. H. H.		Prestend, nr Droitwich
Fortescue, Lord, F.R.S.	17, Grosvenor-sq.	Dublin Castle
Freeman, W. Peere W.		Fawley Court, Buckingsh.
Gibbs, Humphrey	9, Piccadilly	
Gillies, Robert Maule	Corn Exchange	
Gooch, Sir T. S., Bart.		Benacre Hall, Suffolk
Gordon, R., M.P.	29, Dover-street	Kemble House, nr. Cirencester
Grafton, The Duke of	47, Clarges-street	Euston Hall, Thetford, Norfolk
†Graham, Sir J., Bart., M.P. F.R.S.	46, Grosvenor-place	Netherby, nr Carlisle
Greathead, E.	38, St. James's-pl.	Udding, nr. Ringwood, Hants.
Guest, Sir J. J., Bart., M.P., F.R.S.	13, Grosvenor-sq.	Dowlais House, Glamorgan.

Name.	Town Residence.	Country Residence.
Hale, R. B., M.P.	15, Bolton-st.	Alderley Park, Glostershire
†Handley, Henry, M.P.	30, Pall Mall	Culverthorpe Hall, Sleaford
Handley, W. F.	. .	Newark
†Harcourt, G. S., M.P.	3, York-terrace	Ankerwycke House, Bucks.
Harland, C., M.P.	3, Chesterfield-st.	Sutton-on-Forest, Yorkshire
Hartopp, Sir E., Bart.	169, New Bond-st.	Gumley, Leicester
Hatherton, Lord	45, Grosvenor-pl.	Teddesley Park, Walsall
Hayter, W. G., M.P.	9, Lincoln's Inn	Stoberry Park, Wells, Somers.
Heathcoat, J., M.P.	6, Suffolk-street	Tiverton, Devon
Heathcote, Gilbert T., M.P.	16, Hereford-street	Stocken Hall, Grantham
Heathcote, Sir W., Bart., M.P.	29, Green-street	Hursley, Hants.
†Heneage, G. F.	39, Charles-street	Hainton Hall, Wragby
†Herbert, Hon. S., M.P.	1, Grafton-street	Wilton House, Salisbury
Hervey, Wm.	. .	Bradwell Grove, Burford
Hewett, W. H.		
†Hill, Sir R., Bart., M.P.	24, Belgrave-sq.	Hawkestone Hall, Shropshire
Hodges, T. Law, M.P.	16, Suffolk-street	Cranbrook, Kent
†Holford, R. S.	. .	Westonbirt, Tetbury, Glostsh.
†Howick, Viscount, M.P.	16, Whitehall-place	
Hulse, Sir C., Bart	4, Nw Burlingtn-st.	Breamore House, Sarum
†Hulse, Lieut. Col.	Ditto	Ditto, ditto
Huntingfield, Lord	. .	Near Malton
†Huntingtower, Lord	. .	Buckminster, Leicester
Hurst, R. H., M.P.	68, St. James's-st.	Horsham, Sussex
Hyett, W. H.	. .	Painswick, nr Stroud
†Ilchester, Earl of	31, Old Burlngtn-st	Mebury House, Dorset.
Johnstone, Sir J., Bart.	27, Grosvenor-sq.	Hackness, Scarborough, Yorks.
Jones, Rev. J. P.	. .	Elm Green, nr Cirencester
Kensington, Lord	2, Carlton-terrace	Oakley Park, nr Eye, Suffolk
†Kerrison, Lt. Gen. Sir E., Bt. M.P.	13, Gt. Stanhope-st.	Gledington Hall, Ellesmere
Kenyon, Lord	9, Portman-square	Mersham Hatch, Kent
Knatchbull, Sir E., Bart., M.P.	71, Lower Grosv.-st.	
Lainson, Aldm. John	59, Euston-square.	Haughton, Sarsden, Oxon.
Langston, J. H.	143, Piccadilly	Bowood Park, Wiltshire
Lansdowne, Marquis of, F.R.S.	54, Berkeley-sq.	Middleton Hall, Warwicksh.
†Lawley, Sir F., Bart.	18, Grosvenor-sq.	Heckfield, Hartford Bridge
†Lefevre, C. Shaw, M.P.	35, Eaton-place	Stonleigh Abbey, Kenilworth
Leigh, Chandos	. .	Tree Hill, Exeter
Ley, J. H.	4, Richmond-ter.	Pitchford Hall, Shrewsbury
Liverpool, Earl of	Scotland Yard	Rood Ashton, Trowbridge
†Long, Walter, M.P.	29, Hill street	Oakham Park, Ripley, Surrey
Lovelace, Earl of	10, St. James's-pl.	
Maitland, W. W.	11, Gloster-terrace	Henley-on-Thames
Maitland, E. Fuller, F.R.S.	3, Bryanstone-sq.	Brockett Hall, Herts
Melbourne, Viscount	39. South-street,	Leigh Court, Bristol
†Miles, P. J.	7, Hamilton-place,	King's Weston, ditto
†Miles, Wm., M.P.	Ditto	Walton, Warwickshire
†Mordaunt, Sir J., Bart., M.P.	11, Portland-place	Woodchester Park, nr Stroud
†Moreton, Lord	2, Seamore-place	

Names.	Town Residence.	Country Residence.
Morgan, Sir C., Bart.	70, Pall Mall . .	Tredegar, Monmouthshire
Morland, T. T.	. .	Sheepstead, Abingdon, Berks.
Morton, John	. .	ChesterHill,Minchinhampton
†Morrison, J.	57, Upper Harly-st.	Fonthill, Wilts.
Mostyn, Hon, E. M. L. . .	9, Gt. Seymour-st.	
Mostyn,Lord	2, Ditto, ditto .	Mostyn Holywell, Flintshire
†Neeld, Jos. M.P.	6, Grosvenor-sq. .	Grittleton House, Wilts.
Noel, Hon. E. G.	. .	Exton Hall, Stamford
Norfolk, Duke of, F.R.S. .	21, St. James's-sq.	Arundel Castle, Sussex
†Northumberland,Duke of F.R.S	Charing Cross. .	Keilder Castle, Northumb.
Northampton,Marquis of F.R.S	. .	Castle Ashley, Northampton
Nurse, Wm. M.	5, Langham-ter. .	Great Cell Barns, St. Albans
Palmer, R., M.P.	6, Charles-street. .	Holme Park, Reading, Berks.
Patten, J. W., M.P.	24, Hill-street. .	Bank Hall, Warrington
†Peel, Sir Robert, Bart., M.P. F.R.S.	Whitehall Gardens	Drayton Manor, Fazeley
Pegus, Rev. W.	. .	Uffington House, Stamford.
Pendarves, E. W., M.P.,F.R.S.	36, Eaton-place .	Pendarves, Truro, Cornwall
Penruddocke, J. H.	35, Curzon-street	Compton Chamberlayne,Wilt.
†Percival, John	. .	Ryde, Isle of Wight
Phillips, Mark, M.P.	6, Vigo-street . .	The Park, Manchester
Plowden, William	. .	Plowden Castle, Salop
†Popham, General	. .	Littlecott, Wilts
†Portman, Lord	41, Upp. Brook-st.	Bryanston, Blandford, Dorset
Price, Sir R., Bart., M.P. . .	11, Stratton-st. .	Foxley, Hereford
†Pusey, Ph., M.P., F.R.S. . .	35, Grosvenor-sq. .	Pusey, Faringdon, Berks
Pym, Francis	. .	The Hazles, Biggleswade
†Radnor, Earl of	52, Grosvenor-sq. .	Longford Castle, Salisbury
Rayleigh, Lord	6, Albermarle-st. .	Terling, Witham, Essex
†Richmond, Duke of	51, Portland-place	Goodwood, Sussex
Ripon, Earl of, F.R.S. . . .	1, Carlton Gardens	Nocton, Sleaford
Roseberry, Earl of	139, Piccadilly .	Warrenwood, Hertford
†Rutland, Duke of	7, Bolton-street .	Belvoir Castle, Leicestershire
†Sanford, E. A., M.P., F.R.S. .	28, Dover-street .	Mynehead Court, Somerset
Scarborough, Earl of	41, South-st. . .	Sanbeck Park, Yorkshire
Seymour, Henry	39, Upp. Grosvr-st.	Knoyle House, Hinton, Wilts.
Sheffield, Earl of	20, Portland-place	Sheffield Park, Uckfield, Suss.
Sherborne, Lord	9, Hill-street . .	Sherborne, Northleach
Sheridan, R. B.	9, Grosvenor-sq. .	Frampton House, Dorchester
Shuckburgh, Sir F., Bart. FRS	Pavilion, Hans-pl.	Shuckburgh House, Warwick.
Slaney, R. A., M.P.	6, Albany . . .	Walford Manor, Shrewsbury
Smith, Sir C. E., Bart. . .	. .	Bedwell Park, Hatfield
Smith, Jeremiah	. .	Cadbar, Rye, Sussex
†Smith, J. Abel, M.P. . .	47, Belgrave-sq. .	Woodhall Park, Ware, Herts
Smith, W.	. .	Prae Hill, St. Albans, ditto
†Sondes, Lord	17, St. James's-pl.	Rockingham Castle
†Spencer, Earl	27, St. James's-pl.	Althorp, Northampton
Stanhope, John Spencer . .	. .	Cannon Hall, Barnsley
†Stanley, Lord, M.P.	8, St. James's-sq.	Balley Kistern, Tipperary
Stansfield, W. R. C., M.P. .	11, Clarges-street .	Esholt Hall, Bradford
Steel, Sir R.	. .	
Stonor, Thomas	. .	Stonor, Oxon
Stracy, Sir Edward, Bart. FRS	. .	Rackeath Hall, Norwich
†Stradbroke, Earl of . . .	18, Queen-st.	Henham Hall, Wangford

Names.	Town Residence.	Country Residence.
Stuckey, Vincent	126, Sloane-street	Hill House, Langpt., Somertn.
Sumner, Colonel Holme, F.RS	. .	Hatchlands, Guildford
†Sutton, Sir Richard, Bart. .	. .	Norwood Park, Wilts
†Sutherland, Duke of . . .	Stable Yard . .	Trentham, Staffordshire
†Talbot, Earl	. .	Ingestrie Hall, ditto
Thomas, Inigo	. .	Rattan, Eastbourne
†Thompson, P. Beilby . . .	29, Berkeley-sq. .	Escrick Park, Yorkshire
Tower, C. T.	. . . . .	Weald Hall, Brentwd, Essex
†Townley, R. G., M.P. . . .	Limmer's Hotel .	Fulbourn, Cambridge
Trotter, John	. .	Horton, near Epsom
Vansittart, Henry	. .	Kirkleatham, Gainsbro' Yorks.
Vavasour, Sir E., Bart. . .	. .	Haslewood, Yorkshire
Wall, C. B., M.P., F.R.S. .	44, Berkeley-sq. .	Norman Court, Stockbridge
Watson, Hon. Richard . .	36, Davies-street .	Rockingham Castle, Rutlndsh.
Welby, Sir W. E., Bart. . .	8, Upp. Belgrave-st.	Denton Hall, Grantham
†Wellington, Duke of . . .	Hyde Park Corner	Strathfieldsay, Hertford-brdg.
Wentworth, Godfrey W. . .	. .	Woolley Park, Wakefield
†Whitbread, W.	76, Eaton-square .	South Hill, Bedfordshire
Wilbraham, G., M.P., F.R.S.	23, Brook-street .	Delamere House, Norwich
Williams, W., M.P. . . .	31, Pall-Mall . .	
Wilmot, E. W.	. .	Rufford, Ollerton, Notts.
Wills, B.	. .	Camberwell
†Wilson, Henry	. .	Stowlangtoft Hall, Suffolk
Wiltshire, —	. .	
Wingate, W. B.	. .	Hareby, Bolingbroke, Lincsh.
†Worsley, Lord, M.P. . . .	12, Up. Belgrave-st.	Manby Hall, Brigg
Wright, John	6, Henrietta-street	Bellsise Park, Hampstead
†Yarborough, Earl of . . .	17, Arlington-st. .	Brocklesby, Brigg
Youatt, William	11, Adams'-terrace, Camden Town	

LIST OF MEMBERS.

[Life Members are distinguished by a mark thus †.]

Names.	Town Residence.	Country Residence.
Abbott, Thomas	. .	Aylesford, Maidstone, Kent
Acland, T. D., M.P.	92, Jermyn-street	Holnicote, Minehead, Somerset
Adey, Rev. John	. .	Wensley Rectory, Bedale,
Ade, W.	. .	Chorley, Lichfield, Staffs
Agar, Hon. G. C. F.R.S.	. .	Woodstock, Oxon
Aitken —	. .	Deeping Fen, Spalding, Linc.
Aldworth, W., Jun.	. .	Frilford, Berks
Allen, John	. .	Liskeard, Cornwall
Allen, W.	. .	Great Hendred, Berks
Allix, Charles	. .	Willoughby, Lincolnshire
Allpress, R. W.	. .	Burleigh Hill, St. Ives, Hants
Almack, John, Jun.	10, Whitehall-pl.	Leckonfield Park, Yorkshire
Almack, Thomas	Do.	Bishop Burton, Beverley
Almack, Barugh	Do.	
Ambrose —	. .	
Anderson, Robert	. .	Cirencester
Anderson, W.	. .	Oakley, Beds
Andrews, Edwin	. .	Shroton, Devonshire
Arbuthnot, Rt. Hon. Charles	. .	Woodford Lodge, Frapstone
Arnot, David Gale	. .	Wyfold Court, Henley
Ashurst, W. Henry	. .	Waterstock, Oxon
Astbury, W.	62, High-street, Camden Town	
Astley, Sir Jacob, Bart.	7, Cavendish-sq.	Melton Constable, Dereham,
Badcock, John.	. .	Radley, Berks
Badcock, Benjamin	. .	Broad-street, Oxford
Badham, G., D.	. .	Waldring-field, Woodbridge
Bailie, W. H.	33, Cavendish-sq.	
Bailey, C.	. .	Abingdon, Berks
Bailward, John	. .	Horsington, Wincanton,
Baines, John	8, Cleveland-row	Goosnargh, Preston, Lancshre.
Baker, Robert	. .	Writtle, Essex
Baker, Robert W.	. .	Cottesmore, Rutlandshire
Banger, Thomas	. .	Puddletown, Dorset
Barber, R.	. .	Charlton, Tetbury, Glstrshre.
Barclay, J. P.	. .	Haseley, Warwickshire
Barclay, Wm.	. .	St. Caseley, Warwickshire
Barker, George R.	. .	Fairford Park, Glostershire
Barnard, R.	. .	Pusey Farringdon, Berks
Barnett, Charles	. .	Stratton Park, Biggleswade
Barrington, Viscount, M. P.	20, Cavendish-sq.	Beckett House, Farringdon,
Bates, Thomas	. .	Kirkleavington, Yarm,
Bathurst, Earl	8, John-street.	Oakley Park, Cirencester
Baxter, Robert	. .	Doncaster
Beach, Sir M. H., Bart.	20, Portman-sq.	Williamstrip Park, Fairford,
Beach, H.	. .	Oakley Hall, Basingstoke

Names.	Town Residence.	Country Residence.
Beach, John	. .	Redmarley, Glostershire
Beadel, James	. .	Witham, Essex
Beasley, John	. .	Brampton, near Northampton
Beaufort, Henry	. .	Holme, Biggleswade
Beaumont, E. B.	. .	Firmingby, Bawtry
Bedford, John	. .	Boughton House, Lnclnshire.
Bemon, R.	. .	Donnington, Stow
Bennett, James	. .	Cadbury House, Castle Cary
Bennett, Thomas	. .	Woburn, Beds
Bennett, Samuel	. .	Bickering Park, Woburn
Bennett, William	. .	Lewsey, Luton, Beds.
Bennett —	. .	Chax Hill, Newnham
†Benson, Rev. H. B.	. .	Utterby House, Louth
Bethune, Edward	80, Chester-square	-
Bicheno, J. E., F.R.S.	. .	Ty Maen Pyle, Glamorganshire
Bigg, Thomas	15, Crawford-st.	
Binnix, P.	. .	West dean, Chichester
Birks, John	. .	Herring-field
Blackbourn, David	. .	Temple Brewer, Lincolnshire
†Blair, John	18, Calthorpe-st.,	Moseley Lodge, Welford
Bland, Dr.	. .	Grantham, Lincolnshire
Bland, W.	. .	Hartley, Sittingburn, Kent
Blandford, Marquis of	. .	
Blandy, J.	. .	Kingston, Bagpuze, Berks
Blexam W.	. .	Modetenham
Boards, W.	. .	Edmonton, Middlesex
Bolton, Lord	. .	Bolton Hall, Yorkshire
†Boucher, Charles	66, Wimpole-street	
Bourne, George	. .	Halton, Spilsby, Lincolnshire
Bouverie, Edward	. .	Delapree Abbey, Northamptn.
Bowley, E.	. .	Cirencester
Boys, Henry	. .	Waldershaw, Dover
Boys, R.,	. .	East Bourne
Bradley, Edward	. .	Tradiff Cowbridge
Breynton, John	. .	Haunch Hall, Lichfield
Bristow, S. E.	. .	Burthorpe House, Newark
Bromley, R. M.	Admiralty, Somerset House	Meopham, Kent
Bromwell, Rev. R.	. .	Pembroke College, Oxford
Brookes, J.	. .	Hatford, Faringdon, Berks
Brown, Francis	. .	Welbourne, Lincolnshire
Browne, W. R.	. .	Chilton
Bubb, Anthony	. .	Witcombe, Glostershire
Buckley, John	. .	Normanton Hill, Loughboro.
Budd, Captain H., R. N.	. .	Winterburne Basset, Marlbro'
Bulwer, W. Lytton		Hegden Hall, Norfolk
Burder, D.	. .	Abingdon, Berks
Burn, Ilderton	21, Connaught-sq.	
Burnand, W.	. .	Norton, Chichester
Burgess, Robert	. .	Winterburne
Burke, French	84, Gower-street	
Burt, Thomas	. .	Iwerne
Burt, William	. .	Wilchampton
Burtt, James	. .	Clenston
Bury, J. W.	20, Devonshire-st.	
Butcher, W.	. .	Standish, Gloster

Names.	Town Residence.	Country Residence.
Cadle, Joseph		Westbury-on-Severn, Glosters.
†Calcraft, I. H., M. P.	12, Carlton House	Corfe Castle, Dorset
†Caldecott, Thomas	. .	Rugby Lodge, Rugby
Caldecote, R. M.	. .	Eastbourne
Calthorp, Richard	. .	Swinehead Abbey, Boston
Calverley, T.	1, Regent-street	
Calvert, J. W.	11, Blandford-pl.,	
Calvert, Frederick	6, Stone Buildings,	Clayden House, Bucks
Carrington, Geo., Jun.	. .	Missenden, Bucks
Capper, Mrs.	. .	Hailsham House, Sussex
†Carew, W. H. Pole	. .	Antony House, Devonport
Carnegie, Rev. John	. .	Seaford, Sussex
Carter, J. R.	. .	Spalding, Lincolnshire
Cartwright, T. W.	. .	Ragnal Hall, Tuxford, Nots.
Catlin, Thos. W.	. .	Chilesford, Suffolk
†Cator, Rev. Thos.	. .	Skelbrooke Park, Doncaster
Caudwell, W.	. .	Drayton, Bucks
Cayley, E. S., M.P.	12, Great Rider-st.	Wydale, Malton, Yorkshire
Chamberlain, H.	. .	Desford, Leicestershire
Chapman, T.	Arundel-st., Strand	
Chapman, G.	Do.	
Chapman, Thomas	. .	Stonley, Coventry
Charge, Thomas	. .	Barton, Richmond, Yorkshire
Charlton, J.	. .	
Chawner, R. C.	. .	Wall, Lichfield, Staffs
†Cholmeley, Sir M. J., Bart.	. .	Easton, Lincolnshire
Christie, Langham	2, Cumberland-pl.	Preston Deanery
†Chrystie, William	20, Chester Terrace	
Chute, W. W.	. .	Pakenham Hall, Norfolk
Clarke, Rev. C.	. .	Hansted, Suffolk
Clarke, Thos. E.	. .	Chard, Somerset
Clarke, C. I.	. .	Egham, Surrey
Clayden, John	. .	Littlebury, Essex
Clements, Viscount, M.P.	2, Grosvenor-sq.	Rym, Mohill
Clinch, J. W.	. .	Witney, Oxon
Clode, W.	. .	Bakeham House, Egham
Clutton, Robert	. .	Hartswood, Reigate, Surrey
Clutton, John	Parliament-street	
Coleman, Professor, F.R.S.	Veterinary College	
Collingwood, J. W.	. .	Abingdon, Bucks
†Compton, H. C., M.P.	16, Carlton Terrace	Manor House, Lyndhurst,
Connop, H., Jun.	. .	
Cook, John	. .	Down Ampney, Cirencester
Cooke, Layton	12, Pall Mall	
Cooper, J. G.	. .	Blyborough, Suffolk
Cooper, Thomas	. .	Norton, Seaford, Sussex
Copeland, J.	. .	Abingdon, Berks.
Copeland, W.	. .	Abingdon, Berks.
Cormack, W.	Covent Garden	
Cormack, W. J.	Do.	
Cornish, Rev. J. J.	. .	Kenwyn, Cornwall
Corrance, Frederick	. .	Loudham Park, Woodbridge
Cottam, George	Winsley-st.,	
Cotterell, Sir J. G., Bart.,	. .	Garnons, Herefordshire
Courtney, W.	. .	Newton Stacey, Andover
Cowling, C.	. .	Rye Farm, Oxon.
Coyney, W. Hill	. .	Weston Coyney, Staffs

Names.	Town Residence.	Country Residence.
Craddock, Sheldon		Hartsworth, Richmond
Cramp, John		Garlinge, Margate
Cramp, J. M.		St. Peters, Isle of Thanet, Kent
Cripps, Jos., M.P.		Cirencester
Cripps, E.		Do.
Crisp, Thomas		Gedgrave, Suffolk
Croft, Sir John, Bart.	Coulson's Hotel	Cowling Hall, Yorkshire
Cross, W. J.		
Crouch, A. W.		Ridgmont, Woburn, Beds
Crowdy, R.		Farringdon, Bucks
Cubley, Samuel		Quarrington, Lincolnshire
†Cure, Capel	2, Devonshire-pl.	Blake Hall, nr. Ongar, Essex
Davenport, G.		Oxford
Davey, G.		Dorchester
David, Evan		Rhadyr Court, Cardiff
Davies, D. S.		
Davis, W.	363, Oxford-street	
†Davis, Samuel		Swexford Park, Oxon
†Davis, R.	9, St. Helen's Place,	Skeynes, Eden bridge, Kent
Dawson, E. E.		Ingthorpe, Stamford
Dawson, Edward		Aldcliffe Hall, Lancaster
Dean, James		The Yews, Tottenham
Deane, Ralph	23, Bentinck-street	Escourt House, Reading, Brks.
Dew, T.		Longworth, Berks
†Denbigh, Earl of	18, Eaton-place	Newnham Paddock's
Dennis, Robert		Greetham, Horncastle
Denton, Thomas		Lew, Oxfordshire
De Visme, Rev. James		Bath
†Dewing, R.		Carbrooke, Norfolk
Dilke, Captain, R.N.		Maxstoke Castle, Coleshill
Divett, E., M.P.		Bystock, Exmouth
Dixon, R. W.		Wickham Bishops, Essex
Dolphin, J.		Mayfield, Sussex
Doughty, F. G.		Martlesham, nr. Woodbridge
†Drax, I. S. W. S. E.		Charborough Park, Blandford
Druce, Samuel		Ensham, Oxon
†Drummond, A. R.	2, Bryanstone-sq.	Cadland, Southampton
Drury, George		Eastbourne, Sussex
Duckworth, John		Barnet, Herts
Duffield, Christopher		Grantham, Lincolnshire
Duke, W. E.		East Lavant, Chichester
Dunning, Ralph		Bishop Burton, Beverley
Dyer, George		East Tisted, Alton, Hants
Dyke, Rev. H. S.		Plynt, Cornwall
Dymoke, The Hon. Champ.		Scrivelsby Court, Horncastle
Edmonds, W.		Kelmscot, Oxfordshire
Edwardes, Hon. W.		Edmondthorpe, Oakham
Edwards, Hon. Geo.		Noyall Llanarth Aberayron
Edwards, Henry		Barnham, Suffolk
Elliot, John		Chapel Brompton, Northmpt.
Ellman, John		Glynde, Sussex
Ellman, Thomas		Beddingham, do.
Ellman, R. H.		Glynde, do.

Names.	Town Residence.	Country Residence.
Elwood, Lieut. Col. C. W.	. .	Clayton Priory, do.
Ensworth, T.	. .	Oxford
Enys, John S.	. .	Penryn, Cornwall
Evans, W.	. .	Hackney
Eve, Richard	. .	Silsoe, Beds
Ewen, Thos. L'Estrange	. .	Dedham, Essex
Eyston, Charles	. .	Hendred House, Berks
Farrow, W.	. .	Market Rasen, Lincolnshire
Faulkner, Wm.	. .	Burford
Ferard, Joseph	8 Figtree-ct Temple	
Fiennes, Hon. T. T.	Albany	
Filliter, George	. .	
Finlayson, Dr.	. .	4, Regent-st, Cheltenham
Fisher, T. R.	. .	Oxford
Flight, Thomas	Islington . . .	
Floyd, Thomas	. .	Frilford, Berks
†Floyer, John	. .	Stafford, Dorchester
Footner, W. A.	. .	Romsey, Hants
Forster, John	. .	Newton le Willows, Bedale
Fowlie, Wm.	. .	Red House, Hursley, Winchr.
Ffrance, T. R. Wilson	. .	Rawcliff Hall, Preston
†Franklin, Richard	. .	Clemenstine, Glamorganshire
Franklin, John	. .	Ewelm, Benson, Oxon
Franklin, Edward	. .	Ascott, Tetsworth
Fryer, William	. .	Lytchet, Dorset
Fuge, Robert	. .	Dawlish, Devon
Fulshaw, Richard	. .	Knighton, Leicestershire
Gardner, Rev. C.	. .	East Dean, Sussex
Gedney, John	. .	Reden Hall, Harlston
Gee, Thomas	. .	Barton, Lincolnshire
Gibbon, Alexander	. .	Staunton, Gloucestershire
Gibbs, Thomas	9, Piccadilly . .	
Gibbs, William	. .	Alveston Hill, Stratford on Avon
Gibbs, George	26, Dover street.	
Giddy, Charles, R.N.	. .	Penzance, Cornwall
Gilbertson, Matthias	. .	Elm Cottage, Egham
Gillett, Joseph A.	. .	Banbury, Oxon
Gillett, W.	. .	Southleigh, Witney
Gillett, Joseph	. .	Little Haseley, Tilsworth
Gilliat, Atkin	. .	Scrofield, Horncastle
Gills, W.	. .	Alveston Heath, Stratford on Avon
Gladwin, Thomas	. .	Marden Pk, Godstone, Surrey
Goddard, H.	. .	Cliff Wootton, Bassett, Wilts
Godfrey, Edward		West Lodge, Manningtree,
Godwin, John	. .	Durweston, Dorset
Godwin, Richard	. .	
Good, George	. .	Gussage, Dorset
†Goodden, John	. .	Compton House, Sherborne,
Gordlake, T. M.	. .	Wadley House, Farringdon
Goodricke, Sir F., Bart., M.P.	4, Cleveland square	Studley Castle, Warwick

Names.	Town Residence.	Country Residence.
†Goring, H. D., M.P.	17, New Street,	Yapton Place, Arundel, Sussx
Goring, Mrs.	. .	Weston Park, Sussex
Goring, Charles	. .	Weston Park, Sussex
Gorringe, J. P.	. .	Eastbourne, Sussex
Gorringe, Mrs. J. P.	. .	Eastbourne, Sussex
Gough, Frederick	. .	St. Alban's, Herts
Gowing, E.	. .	Eye, Suffolk
Graburn, R. S.	. .	Brauncewell, Sleaford
†Grabwick, W. T.	. .	Ham, Arundel
Grace, Rev. H. T.	. .	Javington, Sussex
Graham, Rev. H. G.		
Grantham Stephen	. .	Stoneham, Lewes Sussex
Green, —	. .	
Green, Rev. G. W.	. .	Court Henry, Llandilo
Grey, W. H. C., F.R.I.S.	29, York buildings	
†Gregg, Thomas	. .	Cole's Park, Buntingford
Gregory, Arthur F.	. .	Stivichale Hall, Coventry
Gresley, Rev. W.	. .	St. Charles, Litchfield
Griffin, John	. .	Hemel Hampstead, Herts
Grimshaw, W.	. .	Hackney
†Grove, Thomas	. .	Fines, Shaftsbury, Dorset
Gwilt, Rev. D.	. .	Icklingham Hall, Milden
Hack, James	. .	Bowley, Chichester
Haines, Edward	. .	Stratton, Gloucestershire
Hale, Thomas	. .	East Hanney, Berks
Hall, John	. .	Wiseton, Bawtry
Hall, George Webb	. .	Sneed Park, Bristol
Halstead, Thomas	. .	Woodcoat, Cheshire
Hammans, C.	. .	Garford, Abingdon
Hamond, W. P.	123, Mount street.	
Hanbury, John	. .	Curborough, Litchfield
Handley, Major	. .	Pointon, Folkingham
Hanmer, Lieutenant-Colonel	. .	Bear Place, Maidenhead,
Harding, Joseph		Maiden Bradley, Wilts
Harris, Robert	. .	Hinton, Abingdon
†Harrison, Richard	. .	Wolverton, nr Stony Stratford
Harvey, R. B.	. .	Harlston
Harvey, R. H.	. .	Sturminster, Newton, Dorset.
Haselfort, R. L.	. .	Boreham, Essex
Hawkesley, Rev. J. W.	. .	Redruth, Cornwall
Hawkins, Thomas	. .	Assington, Suffolk
Hayne, W.	. .	Woodstock, Oxon
Hayward, Drinkwater	. .	Frocester Court, Stroud
Hayward, J. C.	. .	Quedgely, Gloucestershire
Hayward, Henry	. .	Wattington, Oxford
Hayward, William	. .	ManorHouse, Weston Turville
Heald, Dr.	. .	Spalding, Lincolnshire
Heath, Sargeant	. .	Anstey Priory, nr Dorking
Henning, James	. .	Wolverton, Dorchester
Hewer, Jasper	. .	Minchinhampton, Glostersh.
Hewitt, Lieut. R.N.	. .	Eastbourne, Sussex
Heygate, Robert	. .	West Haddon, Northampton
†Heywood, Sir Benjamin Bart.	. .	Manchester
Hicks, Benjamin	. .	Handley, Staffs

Names.	Town Residence.	Country Residence.
Hickson, Richard	. .	Hougham, nr Grantham
Hillyard, Clark	. .	Thorpelands, nr Northampton
Hincks, T. C	. .	Breckonbrough, Thirsk
Hinton, William	. .	Daglingworth, Gloucestershire
Hobbs, Wm.	. .	Bocking, Essex
Hobbs, W. Fisher	. .	Marks Hall, Essex
Hobgen, Joseph	. .	Siddlesham, nr Chichester
Hodgkinson, Richard	. .	Morton Grange, Dorchester
Hodson, W.	. .	Ilford, Sussex
Hodson	. .	Falmer Court Farm
Holbeach, William	. .	Farnborough, Warwickshire
Holcombe, Rev. G. F.	. .	Brinkley, nr Newmarket
Holmes, William S.	. .	Norfolk
Hony, Rev. P.	Athenæum Club .	
Horlock, J. W.	. .	The Rooks, Marshfield
Horwood, John	. .	Steam Park, nr Brackley
Hoskins, K., M.P.	90, Sloane street .	Birch House, Ross
House, John	. .	Anderson
House, John, jun.	. .	Quailston
Howard, Charles	. .	14, Monkgate, York
Howard, G.	. .	
Humfrey, J.	. .	Upton, Abingdon
Humfrey, John	. .	Ditto, ditto
Humfrey, William	. .	Boxford, ditto
Hurst, —	. .	Radmel Farm, Eastbourne
Husband, T., jun.	. .	Stoke, Devonport
Hutt, John	. .	Water Eaton, nr Oxford
Hutton, John	. .	Marske Hall, nr Richmond
Hutton, William	. .	Gate Barton, nr Gainsbro'
Ide, John	. .	West Wittering, Sussex
Inge, Capt.	. .	
Inskip, Thomas	. .	Marston, Beds
Isaacson, John	. .	Clare, Suffolk
Jackson, Hugh	. .	Wisbeach, Isle of Ely
Jarratt, William	. .	Lletai, Glamorganshire
Jellicoe, John	. .	Brighterton
Jemmett, Henry	. .	Burford
Jervis, Sir Raymond	. .	Fair Oak Park
Jodrell, Sir R. P., Bart.	64, Portland place	Sall Park, Norfolk
Johnston, Sir F., Bart.	. .	Melton Mowbray
Johnstone, John H.	. .	Menston, nr Ledbury
Johnson, Rev. Dr.	. .	Perran, Cornwall
Johnson, C. W.	14, Gray's inn sqre	
Jonas, Samuel	. .	Ickleton, Cambridgeshire
Jones, John	. .	Harrington, nr Spilsby
Jones, Wm.	. .	Sheep House, nr Glo'ster
Kedward, J. D.	. .	
Kendle, C. J.	. .	Fordham, Downham Market
Kendle, James	. .	Weasenham, Rufham
Kersey, James	. .	Talton, nr Cirencester
Kensay, George	. .	Cornbury Park, Witney
Kilby, George	. .	Queenborough
Kilson, Rev. H.	. .	Folkington, Sussex

Names.	Town Residence.	Country Residence.
Kimberley, G.	. .	Trotsworth, Egham
Kimber, Thomas	. .	North Cerney, Glo'stershire
Kimber, Thomas	. .	Tyfield Wick, Berks
†Kinder, J.	. .	Sandridge Bay, St. Albans
Kinder, Thomas	. .	ditto ditto
King. J. Bennett	. .	Wotton, Abingdon
Kingsmill, William	Lambeth Palace	Sidmonton Park, Hants
Kinsman, Rev. R. B.	. .	Cornwall
Kirby, John	. .	South Moreton
†Knatchbull, William	. .	Babington, Frome, Somerset
†Knight, H. Gally, M.P.	69, Grosvenor-sq.	Firbeck Hall, Bawtry, Yorksh.
Langdale, Hon. C., M.P.	31, Jermyn-street.	Houghton Hall, Market-Weighton
Large, Charles	. .	Broadwell, nr Burford
Latham, R. C.	. .	Clifton, Oxon
Law, Rev. R.	. .	Christian Malford, Wilts
Lawson, W. C.	. .	Edinburgh
Lawson, Andrew	. .	Boroughbridge Hall
Le Couteur, Col.	. .	Belle Vue, Jersey
Lediard, Thomas	. .	Cirencester
†Lee, Lee J.,	. .	Delington House, Ilminster
Lemon, Sir C., Bart., M.P., F.R.S.	46, Charles-street	Carclew, Cornwall
Lethbridge, Sir T. B., Bart.	. .	Sandhill Park, Somerset
Lewis, Robert	. .	Stompain
Leifchild, W. G.	Lothbury . . .	Enfield, Middlesex
Littlewood, John	. .	Armthorpe, Doncaster
Livesay, Thomas	. .	Hackney
Lloyd, Cynnic	. .	Pontryfyth, Denbigh
Lloyd, L. F. Lloyd	. .	Ditto Ditto
Lloyd, Llewellyn	. .	Ditto Ditto
Lloyd, Rev. T.	. .	Swayfield, North Walsham
Lock, George	. .	Blandford, Dorset
Lugor, E.	. .	Hengrave, Bury St. Edmonds
Lumbert, R. C.	. .	Burleigh Hill, Reading
Lush, Joseph	. .	Kilmington, Somerset
†Lyon, James	39, Belgrave-sq.	
Mabbott, W. C.	. .	Lewes, Sussex
Macnamara, A.	7 Low. Seymour-st	Langoed Castle, Brecon
†Mainwaring, T.	. .	Gt. Markwell Hall, Wrexham
Maltby, E. H	Paper-bldgs, Temp.	
Manby, Capt. G., F.R.S.	. .	Royal Barracks, Yarmouth
†March, Earl of	19, Stratford-place.	Goodwood, Sussex
Marshall, Capt. Henry	4. Upper Eaton-st.	
Marshall, W., M.P.	41, Up. Grosvenor-st	Patterdale Hall, Carlisle
Marshall, W.	. .	Hurst, Sussex
Marsham, R.	. .	Merton College, Oxford
Martin, H. B.	. .	Colston Hall, Bingham
Martin, Robert	. .	Asterby, nr Horncastle
Mason, C. A.	. .	Farrinton, nr Ledbury
Massop, John	. .	
Masters, Joseph	. .	Witney
Maton, J.	. .	Collingbourne, nr Pewsey

Names.	Town Residence.	Country Residence.
Matson, Robert		Wingham, Kent
Matthews, Peter		Elkstone, nr Cirencester
Mauleverer, William		Arncliffe Hall, Cleveland Inn
Maxwell, W.		Everingham, Pocklington
May, Charles		
Mayne, T. J., F.R.S.		Tiffont House, Salisbury
†Metcalfe, C. J., Jun.		Roxton House, St. Neots
Miller, Rev. M. H.		Scarborough, Yorkshire
Millington, Bryan		Asgarby, Sleaford
†Milne, Alexander	Woods & Forests	
Milne, J. L.		Hilgay Lodge, Downham
Milnes, R. M., M.P.	26, Pall Mall	Frieston, nr Ferry Bridge
Monck —		Coley Park, Reading
Moody, C. A.		Kingsdown, Ilchester
Moor, Edward, F.R.S.		Bealings, nr Woodbridge
Moore, Rev. H.		Willingdon, Sussex
Moseley, John		Glenham
Mount, William		Wasing-pl., Newbury, Berks
Mundy, J.		Cullam, Oxon
Muskett, James		Lambsgrey farm Forest of Dean
Muskett, John		Farnham, Bury St. Edmonds
Neale, H. St. John		Ringwood, Hants
Neame, Frederick		Sellinge, nr Faversham
Neve, Thomas		Benenden, Kent
Niblett, D.		Haresfield, Gloucestershire
Nicholson, W. H.		
Nicklin, Richard		Tipton, near Birmingham
Noakes, T.		Warncocks, nr Eastbourne
Norreys, Lord, M.P.	19, Hanover-square	Wytham, Berks
North, Frederick		Rougham, Norfolk
Northeast, Thomas		Tedworth, nr Andover
Noyes, Thomas H.		East Mascals, Lindfield
Oakley, Thomas		Waterend Farm, Sandridge
O'Brien, Stafford		Blatherwycke Park, Stamford
Ogle, Henry		Eastbourne, Sussex
Oliver, William		
†Oliverson, Richard	14, Portland-place	
Oliver, James		Hanford
Osborne, C.		Haling, Ensworth
Overman, C. E.		Burnham Westgate, Norfolk
Overman, T. W.		Maulden, Beds
Overman, W.		Burnham Sutton, Norfolk
Overman, Henry		Weasenham, Norfolk
Pagden		Eastbourne, Sussex
Page, W. Woods	17, Wimpole-street	
Paget, Henry		Birtoll, Leicestershire
Paget, George		Sutton Bonington, Kegworth
Paget, Charles		Ruddington, nr Notts
Pain, Philip		Boughton House, Kettering
Paicey, Robert		Chedgelow, nr Tetbury
Palmer, G., M.P.		Wasing Park, Essex
Park, Rev. W.		Ince Hall, Cheshire
Parker, Admiral Sir H., Bart.	27, Charles-street	Melford Hall, Long Melford
Parker, T., M.P.	9, Conduit-street	Ensham Hall, Oxon

Names.	Town Residence.	Country Residence.
Parker, C. C.	. .	Woodham Mortimer, Essex
Parker, Oxley	. .	Ditto Ditto
Parker, Henry	. .	Fairford, Gloucestershire
Parkes, J. W. H.	. .	Mawbey Gate, Southampton
Parkinson, W. R.	. .	Mushham, near Newark
Parry, G. F.	. .	Duisk Lodge, Ayrshire
Parsons, George	. .	West Lambrook, S. Petherton
Parsons, John	. .	Old Bank, Oxford
Parsons, J. M.	6, Raymond-buildings, Grays Inn	
†Patterson, W. J.	. .	Durnford Lodge, Wimbledon
Payn, William	. .	Kiddwells, Maidenhead
Peacock, John A.	. .	Osbournby, Lincolnshire
†Pell, Sir W. O.	United Service Club	Synell Hall, Northamptonshire
Pell, Edward	. .	
Peppercorn, Henry	. .	Aylesford, nr Maidstone
Percival, Thomas	. .	Cranford, Middlesex
Percival, William	Regents pk Barrks.	
Perkins, Joseph	. .	Laughton, Leicestershire
Perry, G. W.	Fore-street, City	
Peters, J. W.	. .	Bridge, South Petherton
Philips, J. Burton	10, Park Cresent	
Phillpotts, Rev. T.	. .	Gwennap, Cornwall
Phipps, T. H., Jun.	. .	Leighton House, Westbury
Picken, William	. .	Whitemoor, nr Ollerton
Pickering, Leonard	. .	Wilcot, nr Witney
Pillans, William	. .	Nymphsfield Minchinhampton
Pinney, William, M.P.	30, Berkeley-sq.	The Park, nr Somerton
Pinnock, Rev. J.	. .	Madron
Pinnock, Rev. H.	. .	Moroah
Pittman, Rev. T.	. .	Eastbourne, Sussex
Platt, J. C.	22, Ludgate-street	
Plestow, C. Berners	. .	Wattington Hall, Norfolk
Polhill, William	. .	Eyford, Glo'ster
Powell, Alexander	. .	Hurdcott House, Wilts
Powell, W.	. .	Marcham, Bucks
Punnet, Rev. J.	. .	St. Gotta, Cornwall
Purrott, John	. .	Moins Farm, nr St. Albans
Purser, John	. .	Willingdon, nr Bedford
Putland, John	. .	Firle, Sussex
Randall, Richard	. .	Tunbridge Wells
Ransome, James	. .	Ipswich
Ransome, Robert	. .	Ditto
Ransome, J. A.	. .	Yoxford, nr Ipswich
Rason, W.	. .	Eastbourne, Sussex
Ravenhill, John	. .	Warminster, Wilts
Rawden, C. W.	. .	Eastbourne, Sussex
Rawlence, G. C.	. .	Fordingbridge
Reay, John, Jun.	. .	East Dulwich, Surrey
Rham, Rev. W. L.	. .	Winkfield, Bracknell, Berks
Rhodes, J. A.	. .	Horsforth Hall, Leeds
Rice, E. R., M.P.	16, Suffolk-square	Dover, Kent
Richards, James	. .	Dumbleton, Gloucestershire
Richards, Rev. T.	. .	Aberystwyth, Cardiganshire
Ridgway, J.	Piccadilly	

Names.	Town Residence.	Country Residence.
Riddick, William	. .	Cirencester
Rigg, R.	2, Chatham-place	
Roberts, Robert	. .	Ranceby, Lincolnshire
Robins, B.	. .	East Lavant, nr Chichester
Robertson, D.	Austin Friars	
Robinson, T.	. .	Old Bank, Oxford
Robinson, Rev. W. B.	. .	Lithington, Sussex
†Rodd, Rev. Edward, D.D.	. .	Trebartha Hall, Cornwall
Roden, G.	. .	Sutton Madoc, nr Shiffnall
Rogerson, John	. .	Camden Town
Rogerson, Joseph	. .	Camden Town
Rolfe, J.	. .	Beaconsfield, Bucks
Rolls, J. E. W.	. .	
Ross, Rev. A.	. .	Westwell Vicarage, Maidstone
Round, C. G., M.P.	12, Suffolk-street	
Rowland, Richard	. .	Creslow, Bucks
Rowland, William	. .	Water Eaton, nr Oxford
Rusbridger, John	. .	Goodwood, Sussex
†Russell, Lord C., M.P.	6, Belgrave-square	Woburn, Beds
Russell, T. A.	. .	Cheshunt pk, Waltham Cross
Ryde, W. H.	. .	Aylesbury
Sadler, Henry	. .	Lavant, Sussex
Salomons, David	16, Cumberland-st.	Broom Hill, Tonbridge
Salter, T. F.	. .	Great Hallingbury, Essex
Sampson, Benjamin	. .	Tulley Main, nr Truro
Sanald, S.	. .	Great Caureston House
Sargeant, Edward	. .	Stamford, Lincolnshire
†Sarney, Edward	. .	Soundess, Oxford
Satterfield, Joshua	. .	Green Heys, Manchester
†Saunders, T. B.	6, Brompton-square	
Savill, Samuel	. .	Bocking, Essex
Sawbridge, H. B.	. .	East Haddon, Northampton
Scales, John	. .	Hilloughton, Norfolk
Scotson, Samuel	. .	Toxteth Park, Liverpool
Scudamore, Lieut.-Col.	. .	Kentchurch Court, Hereford
Seawell, Henry	. .	Little Bookham, Surrey
Selmes, Samuel	. .	Beckley, Sussex
Sewell, Professor	Royal Veter. Collg.	
Shaw, William	King's road	
Shawe, R. N.	. .	Kesgrave Hall, Woodbridge
†Shawe, R. F.	. .	Brantingham, Hull
Sheepshanks, Archdeacon	. .	Gluvia, Cornwall
Sherborn, G.	. .	Ashford nr Staines, Middlesex
Sherborn, Francis	. .	Bedfont, Middlesex
Sherratt, John	. .	Litchfield, Staffs
Shitler, John	. .	Bradford Farm
Simonds, J. B.	. .	Twickenham, Middlesex
Skirving, W.	. .	15, Queen-square, Walton
Slack, J. Albin	. .	Redbourn House, Hants
Slatter, William	. .	Stratton, nr Cirencester
Smith, Robert	. .	Heath Farm, St. Albans
Smith, Sir J. W., Bart.	. .	Denver House, Blandford
†Smith, J., jun.	. .	Denver House, Blandford
Smith, C. B.	. .	Whaddon, Gloucestershire
Smyth, George	. .	
Smythies, Rev. J. R.	. .	Lynch Park, nr Leominster

Names.	Town Residence.	Country Residence.
Snow, Benjamin	. .	Sleaford, Lincolnshire
Snow, Johnson	. .	Evodon, Lincolnshire
Snowden, Rev. C. C.	. .	Slooe, Sussex
Somes, Samuel	. .	Wollaston, nr Willingboro'
Souhter, George	. .	Box Grove, nr Chichester
Sparkes, William	. .	Crewkerne, Somerset
†Spencer, Hon. Capt., M.P.	27, St. James'-place	Althorp, Northampton
Spooner, C.	Veterinary College	Camden Town
Stace —	. .	Berwick, Sussex
Stallard, Joseph	. .	Redmarley, Glostershire
Stannier John	. .	Heaton, nr Shrewsbury
Stanley, Edward	14, Grosvenor-sq.	
Starling, Robert	14, Norfolk-square	
Starr, John	. .	Eastbourne, Sussex
St. Clair, Capt.	. .	Staverton Court, Glostershire
†Steuart, Robert, M.P.	10. Up Belgrave-sq	Alderston, Haddington
Stokes, Charles	. .	Kingston Keyworth, Notts
Stokes, J. Allen	. .	Kervington, nr Evesham
Stokes, John	. .	Pauntley, Gloucestershire
Stone, W.	. .	Streetley House, Reading
Stone, Mark	. .	Tyfield Wick, Berks
Stone, George	. .	Ditto
Strafford, Henry	7, Brecknock-cres.	
Strickland, W.	. .	Oxford
Stringer, Miles	. .	Effingham Hill
Stroud, Henry	. .	Spetesbury, nr Poole
Sumner, Rev. C. V.	. .	
Sutherland, J. W.	. .	Croydon, Surrey
Swann, James	. .	Ensham, nr Oxford
Tanner, William	. .	Patcham, nr Brighton
Tattersall, J.	46, Lw Belgrave-st	
Taunton, W. P.	. .	Bristol
†Tawney, Henry	. .	Banbury, Oxon
†Tawney, Charles	. .	Oxford
Taylor, Walter	. .	Hockley, nr Alresford
Thackrah, George	. .	Feltham, Middlesex
Thimbleby, William	. .	East Kirby, nr Bolingbroke
Thomas, James	. .	Lidlington, nr Woburn
Thompson, H. S.	. .	Kirby Hall, Boroughbridge
†Thompson, C. P., M.P.	13, South Audley-st	
Thomson Guy	. .	Old Bank, Oxford
Thornton, Stephen	. .	Moggesharges House
Thorold, B. H..	12, Abingdon-st	Harmonston Hall, nr Lincoln
Throgmorton, R. G.	. .	Buckland, nr Faringdon
Thurston, Capt. C., R.N.	. .	Machyulleth
Tilden, John	. .	Ifield Court, Gravesend
Tillyer, James	. .	Harmondsworth, Middlesex
Tillyer, George	. .	Feltham, Middlesex
Tindale, Benjamin	. .	Ewerby, Lincolnshire
Toovey, Henry	. .	Joyce Grove, Oxon
Toovey, Thomas	. .	Hambleden, Bucks
Torr, W. jun.	. .	Riby, nr Caister
Toynbee, G.	. .	Heckington, Lincolnshire
Treby, Henry Hale	. .	Cobham Lodge, Cobham
Trevor, Hon. Gen.	. .	Glynde, nr Lewes, Sussex
Treweeke, Rev. G.	. .	Illogan, Cornwall

Names.	Town Residence.	Country Residence.
Trinder, Daniel	. .	Cirencester
Trumper, James	. .	Southall, Middlesex
Trumper, Wm.	. .	Iver, Bucks
Tuckey, Thomas	. .	Compton Beauchamp
Tuckwell, Humphrey	. .	Signet, nr Burford
Turner, George	. .	Barton Assington, nr Exeter
Turner, C.	. .	Stoke, Grantham
Twynham, Dr.	. .	Lainston House, nr Winchest.
Twynam, J. T.	. .	Whitechurch, Hants
Umbers, Thomas	. .	Wappenbury, Warwickshire
Umbers, W., jun.	. .	Wappenbury, Warwickshire
Uppleby, S.	. .	Wootton House, Lincolnshire
Unwin, Stephen, jun.	. .	Coggeshall, Essex
Upton, Henry	. .	Aldwick, nr Bognor
Vaïsey, Thomas	. .	Stratton, nr Cirencester
Vaizey, George	. .	Halsted, Essex
†Vane, Rev. J.	. .	Dulwich, Surrey
Vines, R.	13, Great College-st	
†Verney, Sir H. Bart., M.P.	5, Park-st Westmr.	Claydon House, Bucks
Villebois, F.	. .	Benham Place, Newbury
Walesby, Prime	. .	Ranby, nr Horncastle
Walker, George	. .	Greenfield Lodge, Strixton
Walker, John	. .	Barton, nr Worcester
Waller, H. S.	. .	Farrington, Northleach
Walpole, William	. .	
Walsh, Sir John, Bart., M.P.	28, Berkeley-square	Warfield House, Berks
Walters, J. W.	. .	Barnwood, Gloucestershire
Warburton, H., M.P., F.R.S.	45, Cadogan-place	
Warry, George	. .	Shapwick, Glastonbury
Ward, H. G., M.P.	2, Cleveland-street	Gilsten Park, Herts
Washbourne T. E.	. .	Speenhamland, Newbury
Washbourne, E. B.	. .	Ditto Ditto
Watson, Henry	. .	Walkeringham, nr Bawtry
Weall, Thomas	. .	Woodcote Lodge, Beadington
Webb, William	3 Arundel-st. Strand	
Webb, Jonas	. .	Babraham, nr Cambridge
Webster, Lady	. .	Battle Abbey, Sussex
Webster, J.	. .	Penns, nr Birmingham
†Weeding, Thomas	47, Mecklinbrg-sq.	
Weeks, Frederick	. .	Hurstpoint, nr Brighton
Welland, Charles	. .	
Wells, Thomas	. .	Hampnett, Northleach
Wells, Fleetwood	. .	Ellsboro', nr Andover
Welstead, Benjamin	. .	Kimbolton, Hants
Welton, Cornelius	. .	
West, John	. .	Miningsby, nr Horncastle
Western, Lord	35, South-street	Felix Hall, Kelvedon, Essex
Westhead, John	. .	Manchester
†Weyland, John, F.R.S.	52, Charles-street	Woodrising Hall, Norfolk
White, Joseph	. .	Anfield, nr Romsey
Whitear, Rev. W.	. .	Harleston, Norfolk

Names.	Town Residence.	Country Residence.
Whittington, G.	13, Size-lane, City	Whitmore House, Ripley
Whitlaw, C.	30, Argyl-street	
Whitting, J. H.	. .	
†Wickens, J. Stephens . . .	35, Mortimer-street	
Wicksted, Charles . . .	. .	Brand, Market Drayton
Wilkinson, Rev. F. . . .	. .	Eastbourne, Sussex
Wilkinson, Capt.	. .	Walsham, Suffolk
Wilkinson, George . . .	. .	Wolverton, Stony Stratford
†Willoughby, H.	. .	
Wilmot, Sir E., Bart., M.P. F.R.S	Athenæum	Berkswell Hall, Warwick
Winder, J. W. Lyon . . .	. .	Horstead House, Norwich
Wingate, Thomas	. .	Owmby, nr Caister
Wither, Rev. L. B. . . .	. .	Manydown Park, Basingstoke
Withers, R.	. .	Gussage, St. Michael
Wodehouse, E., M.P. . . .	Limmer's Hotel	Windham, Norfolk
Wolfe, R. B.	. .	Wood Hall, nr Newport
†Wood, C., M.P.	Admiralty	Ickleton Hall, Doncaster
Wood, George James . . .	. .	Adminster, Dorset
Wood, H.	. .	Bramdean House, Alresford
Wood, John	. .	Heath Farm, Cassiobury
Wood, James	. .	Twineham, Cuckfield
Wood, John	28, Chester-street	Melton, nr Woodbridge
Woods, W. L.	. .	Chilgrove, Sussex
Woodward, William . .	. .	Bredons Morton, Tewkesbury
Woolff, Rev. G.	. .	Gwinear, Cornwall
Worthington, R.	. .	Brockhurst, nr Coventry
†Wratislaw, W. F.	. .	Rugby, Warwickshire
Wyndham, W., Jun. . . .	. .	Dinton, Salisbury
Yeatman, Rev. H. F. . . .	. .	Stool House, Sturminster
Yeld, W. W.	. .	Armitage, Rugeley
Yelloly, John, M.D., F.R.S. .	. .	Woodton Hall, Norfolk
Young, M.	. .	Begbrook, nr Woodstock
Young, Rev. B.	. .	Wartling, Sussex
Zetland, Earl of . . .	17, Hertford-street	Upleatham Hall, Gainsbro'

HONORARY MEMBERS.

Stevenson, A., Esq., United States' Minister.

Weyer, M. Van de, Belgian Minister.

ENGLISH AGRICULTURAL SOCIETY,

1839—1840.

English Agricultural Society,

5, Cavendish Square.

ANNUAL LONDON MEETING,

May 22nd, 1839.

REPORT OF THE COMMITTEE.

It is with much satisfaction that your Committee lay before the Society their First Yearly Report on the general state of our affairs; since, although our efforts for the improvement of English Husbandry are as yet necessarily imperfect, the support which has been received from the public warrants a confident hope that those efforts, if steadily continued on our part, will be duly seconded on theirs, and will meet with final success.

The number of our members consists, on this our first anniversary, of 230 Governors (72 of whom are for life, and 158 by a subscription of 5*l.* yearly), and of 874 ordinary members (64 of whom are for life, and the remaining 810 by subscription): the total being 1104 members of all classes.*

A statement of our finances will be found in the balance-sheet annexed to this Report.

Since our last Report a list of prizes has been published for stock to be shown at the approaching Oxford Meeting. These amount altogether to 740*l.*, besides 50*l.* for extra stock, implements, roots, and seeds, 50*l.* for a draining plough, and two prizes of 50 sovereigns each for the best specimens of white and of red seed-wheat; this last being an object which your Committee regard as of especial importance. It has been already reported

* On the 4th of September, 1839, the English Agricultural Society consisted of 1838 Subscribers: namely, 2 Honorary Members, 80 Life-Governors, 183 Governors, 90 Life-Members, and 1483 Members.

to the Society, that ten prizes had also been offered for essays to be read before that meeting. On this point, as the award of the judges is not yet known, it can only be stated that there are claimants for all those prizes, and that there is competition for nine. Your Committee cannot leave this subject without adverting to the fact, that the active Local Committee, which has been for some time engaged in making the necessary arrangements for the meeting, has received the most obliging encouragement from the highest authorities both of the University and City of Oxford.

It has been already made known to you that communications have been opened with the agricultural societies of Paris, Lyons, Lille, and Geneva. We have now to add those of Thoulouse and Bordeaux abroad, and the Entomological, Horticultural, and Statistical Societies at home.

It being extremely desirable that, according to the practice of other societies, we should form a Library of reference open to our members, application has been in the first instance made to the Treasury for the use of those books which formerly belonged to the late Board of Agriculture, and the loan of these has been accorded us.

A request has been further addressed to the same quarter, that the Director of the Ordnance Geological Survey, Mr. De La Beche, who, among other objects, is in that capacity collecting specimens of the various soils and subsoils of England, might be permitted to supply the Society with duplicate specimens to be deposited in our Museum, on our undertaking to defray any expense that may be thereby incurred; and to this request, also, a favourable answer has been received.

In accordance, likewise, with the experience and practice of other Societies, having for their object the promotion of any department of knowledge, it has been determined to publish from time to time such communications of facts or such other suggestions, authenticated by the names of the writers, as appear likely to contribute to the progress of husbandry, and the first number of our Journal was accordingly published in April last.

Having thus reported such steps as your Committee have taken in discharge of the trust committed to them by the Society, they are now desirous shortly to advert to some of the heads under which it appears to them that our future labours in the promotion of agricultural knowledge may be conveniently classed. The first of these appears to them to be a more accurate acquaintance with the characteristics of soils, and it might properly be termed the—

I.—Classification of Soils.

It is well known to practical farmers that in fields, where the soil is seemingly throughout of one character, various qualities are found by experience to exist in different portions; that diversity is found, of course, to be greater in larger divisions, such as farms, parishes, and hundreds. Attempts have been made by chemical examination to ascertain and account for these variations, but not as yet with any decided success. It appears, however, that geologists, in making their surveys, often readily distinguish the strata, which they seek to lay down in their maps by the vegetation which appears on the surface, and many facts might be adduced in support of the connexion between the geological and agricultural characters of given districts. It has been proposed, therefore, by the Journal Committee, that a survey should be made of the Weald of Kent and Sussex, as a first step towards bringing this view into a tangible shape, it being obvious that a correct knowledge of the various soils of this country is the only solid foundation of English agricultural science.*

II.—Permanent Improvement of Soils.

The large sums yearly laid out in drainage, and the yet larger amounts which might probably be so expended with advantage, show the necessity of attending carefully to the details of this process, as to the depth, distance, materials of the drains, in different

* A Sub-Committee of Geology has since been appointed, who will have specially to consider the survey here referred to.

soils and inclinations of level. The Deanston process of deep and frequent draining, coupled with subsoil ploughing, appears also to deserve especial attention: soils, too, which are not over wet, may still be found capable of being deepened, as well as of being otherwise improved in their chemical or mechanical character by judicious admixture.

III.—Productiveness of Seeds.

Under this head it is desirable that experiments should be made by individual members on the comparative productiveness of each kind of corn, in amount both of grain and of straw upon different qualities of soil: nor can the result be regarded as complete, unless the goodness of the grain, its power, that is, of yielding flour, be tested, as well as its weight and bulk. It has been even shown by experiment that two samples of flour similar in apparent quality have yielded different proportions of bread. In the same way the productiveness of the varieties of turnip, beet, carrot, potato, &c., should be respectively tested; and the bulk being ascertained, the nutritive properties possessed by equal bulks should be discovered, either by chemical analysis or by actual trial in the feeding of cattle. These roots might also be tried with advantage against each other, as turnips against mangel-wurzel, both as to amount of produce and as to nutritive power, and that too upon the different kinds of stock usually kept.

IV.—Manures.

This, again, is a large subject, complicated by the various conditions of soil, crop, climate, and time under which the various manures may have to be applied. Without attempting, at present, to lay down specific details, it will be sufficient to stimulate the inquiries of our members if we enumerate some of the principal heads:—

I.—Natural or farm-yard manure. 1. Degree of fermentation. 2. Time of application. 3. Mode of application. 4. Compost

heaps. 5. Improvement by superior feeding. 6. Effect on different crops. 7. Liquid manures.

II.—Artificial manures of a similar nature prepared in towns.

III.—Refuse manures, as bones, rape-cake, rags, malt-dust, &c.

IV.—Mineral manures, as lime, chalk, gypsum, marl, saltpetre, peat-ashes, salt, &c.

V.—Rotation of Crops.

Under this head your Committee will only recommend, at present, that endeavours should be made to ascertain the influence, sometimes favourable and in other cases hurtful, which various crops exercise on others by which they are followed, and which is now supposed to be occasioned by an excrementitious deposit left by the roots of plants in the soil. They would also, however, suggest to members the practical advantage which may arise from multiplying and varying their green crops for the regular support of an increased amount of stock throughout the year.

VI.—Stock.

They will equally abstain from going into detail under this head, as to the many important points in which a comparison might be instituted between our different breeds of cattle and sheep. They trust that one direct effect of the Society's exertions will be to bring the best blood of the most improved breeds into districts where these are comparatively unknown. They are disposed to think that many improvements might be made in the management and feeding of stock; and they would particularly recommend to members of the Society the consideration whether they might not advantageously adopt a more active breed of cart-horses than is usually met with in England; and whether also some changes in the mode of feeding them might not produce increased economy, without diminishing the comfort of the animals, or injuring their condition.

VII.—Mechanics of Agriculture.

Under this head great improvements have been effected of late years: some parts of the country, however, are much in advance of others in their adoption, whether as regards the better construction of ancient implements (the plough in particular); the employment of those which have been recently invented (such as the drill, the scarifier, or the turnip-cutter); or, lastly, in the employment of fixed machinery at the homestead, driven by steam, water, or wind. In these, as well as many other improvements of husbandry, the North and West of England have little more acquaintance with the practices of each other than two distinct nations might be supposed to possess. The disposition of farm-buildings may be included under this general head.

VIII.—Diseases of Cattle and Plants.

1.—*Veterinary Art.*

A deputation has been appointed to confer with the heads of the Veterinary College upon this subject.

2.—*Diseases of Plants.*

Little is known at present of the real nature of the diseases to which plants are liable, and still less of any mode of prevention or cure.

IX.—Grass Farms.

The management of these farms, though in some points necessarily connected with the preceding heads, is sufficiently distinct and important to form a separate head for future investigation, especially as little more is known at present than that different pastures have very different effects on the produce and condition of the stock placed upon them. If it be true, as has been asserted, that the Dutch butter, whether fresh or salted, is much better to

keep than our own, it will be well worth while to inquire into the difference of dairy management in Holland and in this country.

X.—Physiology of Agriculture.

This last head would include questions of a more abstract nature; and whereas, under the others, we should have to observe and record matters of fact—as, for instance, that bone-manure is beneficial on certain soils, and inefficient on certain other soils—under this head we should inquire after causes, and endeavour to answer the question, What is the constituent element of bone which promotes vegetation on some soils, and how is that element rendered inoperative elsewhere?

Your Committee having thus adverted to some of the principal heads which appear to them of most immediate interest in the present state of English husbandry, will conclude by expressing their hope that the members of the Society will strengthen its collective endeavours by their own individual efforts on their respective farms and properties; and that a mass of facts and observations may thus gradually be brought together, by the careful comparison of which, new light may be thrown on many of the obscure and doubtful points of Agricultural science.

STATEMENT OF THE RECEIPTS AND EXPENDITURE OF THE ENGLISH AGRICULTURAL SOCIETY,

From the period of its formation, in May, 1838, to the 10th May, 1839.

Receipts :—				£.	s.	d.
By Life Governors' Compositions				3397	10	0
Governors' Annual Subscriptions in the year 1838	£605	5	0			
" 1839	195	0	0			
				800	5	0
By Life Members' Compositions				651	0	0
By Members' Annual Subscriptions in the year 1838	£334	14	0			
" 1839	233	11	0			
				568	5	0
				£5417	0	0

Expenditure :—				£.	s.	d.
To the charges of Management:						
For Advertisements	£143	19				
Stationery, Postage, Carriage of Parcels, Books, Maps, &c.	85	5	7			
Printing and Lithography	175	16	3			
Salaries to Secretary, &c., to the 12th of May, 1839	245	0	0			
Rent paid to the 12th of May, 1839	337	4	0			
Miscellaneous payments for meetings at Freemasons' Tavern, Coals, &c.	32	15	0			
				1020		2
To Prizes for the amounts distributed to Rev. W. L. Rham	20	0	0			
——— Dudgeon	50	0	0			
				70	0	0
To cost of Furniture, &c.				121	10	4
To permanent investment for purchase in the New $3\frac{1}{2}$ per Cents. :—						
£1970 8 10 Stock cost	2000	0	0			
996 5 3 Ditto ditto	1000	0	0			
£2966 14 1 Stock cost				3000	0	0
To Messrs. Drummond, bankers, for the balance of Cash in their hands				1196	7	9
To Petty Cash for the Balance in the hands of the Secretary				9	1	9
				£5417	0	0

NATH. W. SYMONDS,
Accountant.

London, 10th May, 1839.

OXFORD MEETING.

The Annual Country Meeting of the English Agricultural Society, recently held at Oxford, in the month of July, has fulfilled the expectations of the friends of agricultural improvement; and, in recording a notice in their Journal of the stock and implements exhibited on that occasion, the Committee cannot refrain from congratulating the Society on the successful issue of their first attempt of this kind. The excellent arrangements of the Local Committee, the support of the Mayor and Corporation, and the participation in the whole by the Vice-Chancellor and other leading members of the University, are circumstances which eminently promoted the objects of the Meeting, and the harmony and good understanding of the immense multitude assembled on that occasion; and when it is considered that no less than between two and three thousand individuals—eminent cultivators of the soil, breeders of stock, or friends generally to the advance of husbandry in this kingdom—came from every part of the country to form that Meeting, and were personal inspectors and auditors on subjects connected with the most approved plans of mechanical application, or general modes of management in the various departments of practical farming, the Committee cannot but have a well-grounded assurance of the benefits such an interchange and discussion of opinions must have, not only in bringing farmers into better acquaintance with each other's wants and wishes, but in the removal of those local prejudices which have for so long a period retarded the progress of agricultural improvement in this Country.

The Society have accepted the invitation of the nobility and gentry of the neighbourhood of Cambridge to hold their next

Annual Country Meeting in that city, in July, 1840; and a Committee has been already appointed to hold a conference with some of those gentlemen respecting the arrangements for the occasion.

The Committee feel that many of the minor inconveniences of the first Meeting, arising from the novelty of the undertaking, will no doubt be in a great measure removed or guarded against by the experience already gained, and by their intrusting the management of the business to the same Committee who co-operated with the Local Committee at Oxford.

Exhibition of Stock.

The show of live-stock was numerous, and in most of the classes there were as many superior animals as have often been exhibited together before: there certainly, also, were several of a very inferior description—but this was to be expected. One of the advantages to be derived from an exhibition of this nature is, to show to farmers and breeders of live-stock the perfections in shape and quality at which they ought to aim; and it should, therefore, be no disappointment to the Society to find that some of the exhibitors proved, by the animals which they brought to the show, that they were at present very deficient in this knowledge. It must also be admitted that, if a foreigner had come to Oxford, expecting to see the best show of breeding-stock which England could produce, he would have been led to form a very inadequate idea of the merits of the different sorts of live-stock bred in this country: but the number of excellent animals shown, and the admirable arrangements for showing them which had been made by the Stewards, rendered the exhibition a most interesting and gratifying sight to the thousands who came (some from great distances) to view it.

There would be great difficulty in selecting any individual animals for particular remark: if this were attempted it would be very probable that, from the number exhibited, and from the

unavoidable crowd of spectators, some might be overlooked and omitted in this selection quite equal in merit to those which were noticed. The best guide as to the relative merits of the stock is the decision of the Judges; and, on this occasion, the awards appeared to give more general satisfaction than often is the case at agricultural exhibitions. Some few of the exhibitors were, as might be expected, dissatisfied, but, upon the whole, very little dissatisfaction was expressed; and it appeared in this, as in everything relating to the Meeting, that all who were present were determined to be in good humour.

The prize intended to be given by the Society, in order to ascertain the best and most productive varieties of wheat, cannot be decided. The wheat exhibited was of excellent quality, and the Judges selected, as was intended, two samples of white and two samples of red wheat, of great beauty and purity, for trial; but the desire of the public to examine the different samples shown, and to compare them together, was so great, that not only a great deal of the wheat from the selected parcels was thrown down and lost, but the wheat from all the parcels was mixed together, so that, either as to quantity or to purity, the wheat sown might have been very different from that which was exhibited. The Society, in making their arrangements for the decision of this prize on a future occasion, will take precautions against this accident again occurring.

Award of Premiums.

Class I. (Short-horns).

To Mr. Thomas Bates, of Kirkleavington, near Yarm, Yorkshire: the First Premium of Thirty Sovereigns, for his 3 years and 9 months old Short-horned Bull, bred by himself.

To Mr. Thomas Bates, of Kirkleavington, near Yarm, Yorkshire: the Second Premium of Fifteen Sovereigns, for his 4 years and 8 months old Short-horned Cow, bred by himself.

To Mr. Thomas Bates, of Kirkleavington, near Yarm, Yorkshire: the Third Premium of Fifteen Sovereigns, for his 1 year and 11 months old in-calf Heifer, of the Short-horned breed, bred by himself.

To Mr. Thomas Bates, of Kirkleavington, near Yarm, Yorkshire: the Fourth Premium of Ten Sovereigns, for his 1 year and 10 months old Yearling Heifer of the Short-horned breed, bred by himself.

To The Marquess of Exeter: the Fifth Premium of Ten Sovereigns, for his Lordship's 7 months old Short-horned Bull Calf.

Class II. (Herefords).

To Mr. Thomas Jeffries, Jun., of the Grove, Pembridge, Herefordshire: the First Premium of Thirty Sovereigns, for his 3 years and 10 months old Hereford Bull.

To Mr. James Walker, of North Leach, Gloucestershire: the Second Premium of Fifteen Sovereigns, for his 6 years and 6 months old Hereford Cow.

To Mr. Edward West, of Little Frome, near Bromyard, Herefordshire: the Third Premium of Fifteen Sovereigns, for his 2 years and 7 months old Hereford Heifer, bred by himself.

To Mr. John Hewer, of Hampton Lodge, Hereford: the Fourth Premium of Ten Sovereigns, for his 1 year and 6 months old Yearling Heifer.

To Mr. John Walker, of Burton, near Worcester: the Fifth Premium of Ten Sovereigns, for his 8 months and 2 weeks old Hereford Bull Calf.

Class III. (Devons).

To Mr. Matthew Paull, of Compton-Paunceford, near Wincanton, Somersetshire: the First Premium of Thirty Sovereigns, for his 3 years and 2 months old Devon Bull, bred by the late Mr. W. Davey, of Flitton, North Moulton, Devonshire.

To Mr. J. W. Peters, of South-Petherton, Somerset: the Second Premium of Fifteen Sovereigns, for his 9 years and 6 months old North Devon Cow.

To Mr. Matthew Paull, of Compton-Paunceford, Somerset: the Third Premium of Fifteen Sovereigns, for his 2 years and three months old in-calf Heifer, bred by himself.

To Mr. Matthew Paull, of Compton-Paunceford, Somerset: the Fourth Premium of Ten Sovereigns, for his 1 year and 5 months old Yearling Devon Heifer, bred by himself.

To Mr. Matthew Paull, of Compton-Paunceford, Somerset: the Fifth Premium of Ten Sovereigns, for his 6 months old Devon Bull Calf, bred by himself.

Class IV. (any Breed or Cross, not qualified for the foregoing Classes).

To Mr. Richard Hortin, of Sherbourne, Warwickshire: the First Premium of Thirty Sovereigns, for his 4 years and 2 months old Pure Long-horned Bull.

To Mr. John Putland, of Firle-Place Farm, near Lewes, Sussex: the Second Premium of Fifteen Sovereigns, for his 5 years and 4 months old Pure Sussex Cow.

[No Candidate for the Third Premium of Fifteen Sovereigns, offered for the best in-calf Heifer not exceeding 3 years old, of any breed or cross, not qualified for Classes I., II., and III.]

To Mr. Thomas Stephens, of Whitelackington, near Ilminster, Somersetshire: the Fourth Premium of Ten Sovereigns, for his 1 year and 5 months old Yearling Hereford and Devon Heifer.

To Mr. William Cother, of Middle Aston, near Woodstock, Oxfordshire: the Fifth Premium of Ten Sovereigns, for his 18 weeks old Bull Calf, of the Hereford and Durham breed.

Class V. (Dairy Cattle).

To the Rev. J. R. Smythies, of Lynch Court, near Leominster, Herefordshire: the First Premium of Fifteen Sovereigns, for his 9 years and 6 months old Hereford Cow.

To Mr. Joseph Badcock, of Pyrton, near Tetsworth, Oxfordshire: the Second Premium of Ten Sovereigns, for his 14 years and 2 months old Durham Cow, bred by himself.

Class VI. (Oxen).

To Mr. Richard Rowland, of Creslow, Buckinghamshire: the First Premium of Twenty Sovereigns, for his Five Hereford Oxen.

To Mr. W. Trinder, of Wantage, Berkshire: the Second Premium of Twenty Sovereigns, for his Five North-Devon Oxen, bred by the late Mr. Talbot, of Temple Guiting, Gloucestershire.

Class VII. (Horses).

To Mr. Thomas Freeman, of Henham, near Wangford, Suffolk: the First Premium of Twenty Sovereigns, for the best Cart Stallion.

To Mr. Joseph Osborne, of Chilton, near Thame, Buckinghamshire: the Second Premium of Ten Sovereigns, for the best Cart Mare and Foal.

[The Third Premium of Thirty Sovereigns, for the best Stallion for breeding Hunters, Carriage-horses, or Roadsters, which shall have served mares during the season of 1839, at a price not exceeding 3*l.*, was not adjudged.]

Class VIII. (Leicesters).

To Mr. Samuel Bennett, of Bickerings Park, near Woburn, Bedfordshire: the First Premium of Thirty Sovereigns, for the best Pure Leicester Shearling Ram.

To Mr. Thomas Inskip, of Marston, near Ampthill, Bedfordshire: the Second Premium of Ten Sovereigns, for the Second-best Shearling Leicester Ram.

To Mr. JOHN EARL, of Earl's Barton, Northamptonshire: the Second Premium of the Class of THIRTY SOVEREIGNS, for his 3 years old Pure Leicester Ram.

To Mr. RICHARD ARCHER, of Tachbrook, near Barton, Warwickshire: the Third Premium of TEN SOVEREIGNS, for the best Pen of Five Ewes, with their Lambs.

To Mr. THOMAS UMBERS, of Wappenbury, near Rugby, Warwickshire: the Fourth Premium of TEN SOVEREIGNS, for the best Pen of Five Shearling Leicester Ewes.

CLASS IX. (South Downs, or other Short-woolled Sheep).

To Mr. STEPHEN GRANTHAM, of Stoneham, Sussex: the First Premium of THIRTY SOVEREIGNS, for the best Shearling Short-woolled Ram.

To Mr. JOHN HARRIS, of Hinton, Berkshire: the Premium of TEN SOVEREIGNS, for the Second-best Shearling Short-woolled Ram.

To Mr. THOMAS CRISP, of Gedgrave Hall, Orford, Suffolk: the Second Premium of THIRTY SOVEREIGNS, for his 2 years old South Down Ram.

To Mr. JAMES MATON, of Collingbourne, near Pewsey, Wiltshire: the Third Premium of TEN SOVEREIGNS, for the best Pen of Five Short-woolled Ewes, with their Lambs.

To Mr. JAMES MATON, of Collingbourne, Wiltshire: the Fourth Premium of TEN SOVEREIGNS, for the best Pen of Five Shearling Ewes.

CLASS X. (Long-woolled).

To Mr. CHARLES LARGE, of Broadwell, near Burford, Oxfordshire: the First Premium of THIRTY SOVEREIGNS, for his Shearling Oxfordshire and Long-woolled Ram.

To Mr. WILLIAM SLATTER, of Stratton, Gloucestershire: the Premium of TEN SOVEREIGNS, for his Improved Cotswold Ram, as the Second-best Long-woolled Shearling Ram.

To Mr. CHARLES LARGE, of Broadwell, Oxfordshire: the Second Premium of THIRTY SOVEREIGNS, for his 5 years old Oxfordshire and Long-woolled Ram.

To Mr. J. HEWER, of Eastington, Gloucestershire: the Third Premium of TEN SOVEREIGNS, for his Ewes and Lambs of the Cotswold Breed.

To Mr. CHARLES LARGE, of Broadwell, Oxfordshire: the Fourth Premium of TEN SOVEREIGNS, for his Five Ewes of the Oxfordshire Breed.

CLASS XI. (Pigs).

To the Right Hon. CHARLES SHAW LEFEVRE, M.P., of Heckfield Place, near Hartford Bridge, Hampshire: the First Premium of TEN SOVEREIGNS, for the best Boar.

To Mr. George Carrington, Jun., of the Abbey, Great Missenden, Buckinghamshire: the Second Premium of Five Sovereigns, for the best Sow.

To Mr. Richard Smallbones, of Hordley, near Woodstock, Oxfordshire: the Third Premium of Ten Sovereigns, for his Three 19 weeks old Chinese and Oxfordshire Pigs.

Class XII. (Extra Stock, &c.).

To Mr. John Pinfold, of Oxford: the Sum of Five Pounds, for his 5 years old Hereford Ox.

To Mr. Samuel Druce, of Ensham, near Oxford: the Sum of Ten Pounds, for his 4 years and 4 months old Hereford Ox, bred by Mr. A. T. James, of Mornington, Herefordshire.

To Mr. J. H. Langston, of Sarsden, Oxfordshire: the Sum of Five Pounds, for his 5 years old Short-horned Cow.

[No Award made for the Horses in this Class.]

To Mr. R. Pratt, of Spilsbury, Oxfordshire: the Sum of Five Pounds, for his Three 15 months old Long-woolled Wethers.

To His Grace The Duke of Norfolk: the Sum of Three Pounds, for His Grace's three 2-Shear Wethers.

[No Award made for the Pigs in this Class.]

Lieut.-General Sir Edward Kerrison, Bart., M.P., of Oakley Park, Eye, Suffolk, exhibited 12 bushels of White Wheat; and

Mr. Henry Seawell, of Little Bookham, Surrey, 12 bushels of White Cheddum Wheat:—

Mr. William Spencer, of Adderbury, near Woodstock, exhibited 12 bushels of Improved Burwell Red Wheat; and

Mr. William Fisher Hobbs, of Mark's Hall, near Coggeshall, Essex, 12 bushels of Syer's Red Wheat.

These four specimens were selected by the Judges as the best White and Red Wheats exhibited; they were all of the harvest of 1838, and grown respectively by the parties themselves: in consequence, however, of the extent to which the intermixture of the seed in the different sacks was carried by the public in their examination of the samples, the object of the Society in reference to the contemplated trial of their individual merits was entirely defeated, and the Wheats were returned to their several owners with a complimentary Premium of Twenty Pounds to each. Precautionary measures will be taken in future to prevent a recurrence of this circumstance.

Sweepstakes.

To Mr. Matthew Paull, of Compton-Paunceford, Somersetshire: Sweepstakes of Ten Sovereigns each, for the best Devon Bull, offered by Lord Western and accepted by Mr. Paull and Mr. Peters: decided in favour of Mr. Paull's 3 years and 2 months old Bull.

To Mr. J. W. PETERS, of South-Petherton, Somerset: Sweepstakes of FIVE SOVEREIGNS EACH, for the best Devon Cow, offered by Mr. Paull and accepted by Mr. Peters: decided in favour of Mr. Peters's 9 years and 6 months old Devon Cow.

To Mr. GEORGE CARRINGTON, Jun., of the Abbey, Great Missenden, Buckinghamshire: Sweepstakes of Two SOVEREIGNS EACH, for the best Short-horned Cow, offered by Mr. Carrington and accepted by Mr. Langston; decided in favour of Mr. Carrington.

To Mr. NATHANIEL BLAKE, of Stanton-Harcourt, near Ensham, Oxfordshire: Sweepstakes of FIVE SOVEREIGNS EACH, for the best Ox under 4 years old, fed on Hay and Green Food only, previously to Christmas 1838, offered by Mr. Ferris and accepted by Mr. Blake; decided in favour of Mr. Blake.

COMMENDATIONS.

Mr. H. TUCKWELL's Improved Cotswold Long-woolled Ram, in Class X.

Mr. H. TUCKWELL's Improved Cotswold and Long-woolled Ewes, with their Lambs, in Class X.

Mr. C. LARGE's Oxfordshire Long-woolled Ewes, with Lambs, in Class X.

Mr. R. WOOD's Cotswold Ram, in Class X.

Mr. R. M. PEARCE's Cotswold Ewes, with their Lambs, in Class X.

The Hon. FREDERICK SPENCER's Bay Colt, exhibited in Extra Stock.

EXHIBITION OF IMPLEMENTS.

The exhibition of implements, which was extremely well arranged, added much to the interest of the show-yard. It is true these were, for the most part, familiar to one or other of those present, but it afforded a favourable opportunity of contrasting the implements of different parts of the country; and, to many, there was novelty even in those which had in distant districts been in constant use.

The Society, at the recommendation of the judges, awarded the gold medal to the Messrs. Ransome, of Ipswich, who contributed largely to the exhibition, having sent up their waggons laden with more than six tons of machinery and implements, the superior manufacture and variety of which commanded universal approbation. The judges especially invited attention to the chaff-cutting machines. The one No. XII. is the largest and most powerful of its kind hitherto constructed: it is remarkable

for the equable slicing-cut of the two knives, each 3 feet long, fixed on the fly-wheel, and for the method of advancing the straw. The first operation is effected by the peculiar form of the cutting edge of the knives, which pass through the straw at the same angle with it from point to heel; and are so adjusted as to act with nice precision against the polished metal surface of the straw-box. The straw, which is stationary and firmly compressed by the press-board during the cut, is advanced in the interval of one knife finishing and the other commencing its action. This operation is accomplished, very exactly and simply, by means of an elliptic wheel, driven by an eccentric circular one, whose motion is derived from a latchet-wheel on the same axis acted on by a crank, so that the straw is forced rapidly forward; the press-board in front being at the same time raised to take off the friction, and brought down again with a powerful grip upon the straw, whilst the knife passes through it. A contrivance is also adapted for varying the length of the chaff from 3-8ths to $1\frac{1}{2}$ inch in length. With the $\frac{1}{2}$ inch cut, it was stated to produce $\frac{1}{2}$ a ton of chaff per hour, with the power of 2 horses, and so on in proportion to the length of cut. This machine is equally applicable to steam or water, as to horse power.

Hand-Machines, of a similar construction, with one knife, were exhibited; as also others, cutting only one length of straw, which is advanced by a screw.

Biddell's Scarifier, invented by Arthur Biddell, Esq., of Playford, also manufactured by Messrs. Ransome, and noticed by the judges, is an implement of great utility, and constructed with much mechanical skill and power. It consists of two rows of teeth, fixed in a strong iron frame, supported by a pair of average-sized wheels, and preceded by a pair of smaller. Chisel-points are affixed to the tines, which are removeable, and hoes, of $4\frac{1}{2}$ inches wide for partial hoeing, and 9 inches wide to cut the land close, substituted as occasions may require. The form of the teeth is well adapted for bringing couch-grass to the surface without breaking; and it is represented by those who have used

it as affording a great saving both in time and tillage—breaking and stirring 8 acres per diem with four horses; and being more effective on strong lands than ploughing, as it occasions less treading by horses, and produces more mould. For the purposes also of slightly paring stubbles after harvest, to prevent the seed-weeds from vegetating, and for working summer fallows, it will doubtless bė found a very effective implement.*

The universal Ridge-Plough was constructed by Messrs. Ransome, under the direction of Mr. John Clarke, of Sutton Marsh, Lincolnshire, Secretary to the Wisbeach Agricultural Association, who has the merit of the invention, and to whom a silver medal has been awarded by the Society. This plough is capable of assuming four different forms, suited to four different purposes; and although, in most cases, an implement answers its purpose best when constructed for one purpose only, yet in this case the plough well admitted the variations, and was as perfect, and as well adapted to its several uses in each of its shapes, as if it had been made expressly and only for that one purpose.

The first view of this plough was in the form of a *double-tom,* for earthing up plants sown on wide ridges, or opening water-furrows. In the second, a change of the mould-boards was made, and it became a moulding-plough, of a smaller and more hoe-like description, for going between plants closely planted, loosening the soil and earthing them up. In the third it was a skeleton or broad-share plough, to which shares with curved lines were affixed, for the purpose of clearing land from weeds, &c. In the fourth it became an excellent expanding hoe, with a double-winged share in front, with curved coulters for cleaning the sides of the ridges, and hoes to be used with or without the coulters as occasion may require.

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* A member of our Society, Mr. John Brooks, a practical farmer at Hatford, in Berkshire, worked the whole of his barley-land, after turnips, this year, with Biddell's Scarifier only, and without making any use of the plough. He went over it twice, first with the chisel-points, and afterwards with the broad hoes applied. The soil is a sandy loam on the coral rag. He states that he never had a better crop.—Ph. Pusey.

Messrs. Ransome also exhibited a variety of other ploughs, of superior construction, amongst others a Bedfordshire plough with wheels, to which is attached a lever for enabling the ploughman to regulate the depth of the land-wheel while the plough is in motion. A Belgian plough for turning up turf-land: it has a wide share and concave breast, which is as wide as the wing of the share, and has a gradual rise for a few inches and then turns over rather suddenly. A *double-furrow plough,* originally invented by Lord Somerville, but now greatly improved upon: it is in general use in some parts of Lincolnshire; it does its work very effectively, and in ordinary cases produces a saving of a man and horse for two acres. The *Rutland plough* with wheels, invented by Mr. Baker, of Cottesmore, is of very simple construction, and light of draught; and the *Rackheath ploughs,* for subsoiling light land, as well as one for stirring the soil under the sod in turf-land, both invented and extensively used by Sir Edward Stracey, attracted very considerable attention.

Mr. Hart, of Wantage, exhibited some very clever swing and wheel ploughs; one also by Mr. Howard, of Bedford, of small size, with a mould-board of an excellent form, calculated to give the least resistance in turning over the furrow, was much approved. A plough, made by Roberts, of Warwick, seemed well calculated to plough light soils, and at the same time to stir the subsoil to a depth of 2 or 3 inches, by means of 2 coulters placed in the beam, the one in the furrow before, and the other in the furrow behind, the plough. Messrs. Hannam of Burcett, Davis of Oxon, J. Adams of Great Tew, Russell of Kenilworth, and King of Buckland, exhibited ploughs of various construction.

A plough, on an entirely new principle, was shown by John Le Boutillier, of Jersey. Its object is to raise potatoes, and separate them from the soil, casting them clear of the furrow. It is effected by a succession of paddles, worked nearly at right angles to the mould-board, varying in the speed and force of its revolutions according to the pace of the horses. This implement was

set to work on the day succeeding the show, and performed its work well. It appeared also calculated to throw out root-weeds from the furrow slice, and was especially applicable to the equal distribution of lime or light manures generally, and producing a fine and equal tilth.

Mr. J. Gibbs, of Elsfield, exhibited a draining-plough, on the principle of the mole-plough, and Mr. White, of Courdon, a new subsoil-plough. There were three thrashing-machines in the yard. One, a four-horse portable one, by Messrs. Ransome, was commended for the general good workmanship displayed in it, and the proper proportion of its parts, both as to durability and getting up the required speed, which is said to be 310 revolutions of the beating-drum to 1 of the horses. It was also particularly deserving of attention from the application of the superior toothed wheels, first demonstrated by Professor Airy, and subsequently reduced to practical shape by Professor Willis, in his communication to the Institution of Civil Engineers.

Mr. Garnett exhibited a threshing-machine which is said to thresh from 40 to 50 quarters per diem. It was put to work, and attracted much notice from the regularity of its motions and the great strength of its parts. Mr. Hart's portable threshing-machine differed in principle from those already mentioned, the beater of the drum being only one inch broad, instead of three or four inches, which is the usual breadth. The effect produced by the narrow beater is, that instead of beating out the corn from the straw, as is done by the flail and other threshing-machines, the edge of the beater only comes in contact with the unthreshed corn, and strips off the corn and chaff, without injuring either it or the straw. The superior character of the working of this machine recommends it to notice.

Many excellent drills claim notice. One called the Suffolk drill, by Messrs. Garrett and Sons, has a simple invention to perfect the delivery of the corn when the seed is damp, or when lime or other material is mixed with it. This is effected by a small piece of iron like a pendulum, which is suspended over

each set of cups in the cylinders, and which strikes the handle of each cup as it delivers the corn, which is then shaken completely out. This drill has also a swing lever to move the coulters to either side when drilling land which is not level, and so constructed as to be easily transformed to different sizes.

Mr. Jeago's (of Peasinghall) well-known Suffolk drill was much admired; and a *drop drill*, by Mr. Grounsell, of Louth, received a silver medal from the Society for the novelty and value of the principle involved. This drill has an inner wheel attached to the main wheel of the implement, which, at stated intervals, acts upon a crank, which withdraws a slide from each cup, on the principle of a shot-belt, and deposits the manure at given distances, thereby greatly economising artificial manures, such as bones. This machine is evidently capable of much improvement, but it may be expected to engage the attention of mechanics, as the object to be attained is extremely desirable. When moved by hand it appeared to deposit the manure very regularly at a foot distant, but probably the more rapid pace of a horse would have let it down in a more continuous stream. This may, however, be in a great measure obviated by increasing the diameter of the inner wheel. A *press-roller*, by Hart, of Wantage, appeared well adapted to light lands not apt to clog. Its iron frame, and the manner in which it was attached to the shafts, was neat, strong, and cheaply constructed.

A corn dressing-machine, by Mr. T. Salter, of Hallingbury, Essex, was commended by the judges, and the Society's silver medal was awarded to it. This machine receives the corn in an inclined wire cylinder, through which it is driven by an iron revolving rod armed with short knives, which entirely supersede the use of the common barley-chopper, breaking the beard or tail off barley or oats, and separating the dirt and seeds from the chaff. It is then delivered into the sieves attached, through which the blowers drive a very considerable force of wind. The whole may be worked by two men, one to turn the wheel and the other to serve the hopper.

A newly-invented machine, called a "Scorcher," invented by Messrs. Jones and Draper, of Chorlbury, for burning straw

weeds, or even charring the soil after harvest, attracted the observation of the curious. It was about three feet wide, on wheels, containing a fire-box and a fan, by which the flame was driven through a narrow aperture,

A *cat's-claw drag-harrow,* by Mr. Hannam, was light, and the teeth of an effective form; but it appeared that in the action of cleaning much ground might be missed. A set of light iron harrows were also of an ingenious construction; and a machine, by Moody, of Wilts, for converting turnips, potatoes, &c. into pulp, to be mixed with chaff, attracted considerable notice.

Gardner's excellent turnip-slicer, and a similar one of Edwards', were exhibited, as also one of Hart's, the cutting part of which resembled that of Gardner; but it was placed on the side of a cast-iron disk, instead of being attached, as Gardner's, to the circumference of a cylinder.

Several other implements were on the ground, together with rollers, and two admirably-built waggons by Stratton of Bristol, and King of Berkshire.

Award of Premiums.

To Messrs. Ransome, of Ipswich: the Society's Gold Medal, for their excellent display of Implements, and especially their Chaff-cutting Machines and Biddell's Scarifier.

To Mr. John Clarke, of Long Sutton, Lincolnshire: the Society's Silver Medal, for his Universal Ridge Plough.

To Mr. Grounsell, of Louth: the Society's Silver Medal, for his Drop Drill for depositing wet or dry manure with the seed.

To Mr. T. Salter, of Hallingbury, Essex: the Society's Silver Medal for his Machine for dressing corn.

To Mr. John Le Boutillier, of Jersey: Five Pounds, for his Paddle-Plough for raising Potatoes.

Having thus given an account of the show, it only remains to express a hope that next year a still better exhibition will be made. This is the first occasion on which such a show has been attempted in England, and it is probable that the experience derived from this first attempt will lead to great improvement at the future exhibitions of the Society.

ENGLISH AGRICULTURAL SOCIETY.

RULES.

1. The English Agricultural Society consists of a President, twelve Trustees, twelve Vice-Presidents, Governors, and Members.

2. The President is annually elected, and is not re-eligible for three years.

3. The President, Trustees, and Vice-Presidents, are elected from the Governors.

4. The Governors pay 5*l.* annually, the Members 1*l.*, with the power to compound for life by the payment in one sum of ten annual subscriptions.

5. The Committee of Management consists of the President, Trustees, Vice-Presidents, and fifty Subscribers; twenty-five of whom go out annually by rotation, but may be re-elected.

6. The Committee have the power of appointing Sub-Committees of any subscribers to the Society, of all which sub-committees, the President, Trustees, and Vice-Presidents are members *ex officio.*

7. One general Annual Meeting will be held every year in London, in the month of May; and one in the Country, in the months of July or August.

8. The Committee and all the officers are elected at the annual meeting in London, but do not enter upon the duties of their respective offices until after the annual meeting in the Country.

9. All governors and honorary members have the power of attending meetings of the committee, but have not the privilege of voting unless forming part of that committee.

10. Every candidate for admission into the Society as governor or member must be proposed by a subscriber. The proposer to specify in writing the name, rank, and usual place of residence of the candidate; and every such proposal to be read at the first meeting of the committee next after such candidate shall have been proposed, and every such candidate to be eligible at the then succeeding meeting.

11. No subscriber shall enjoy the privileges of the Society or attend the meetings, whose subscription shall be in arrear.

12. The Committee of Management will meet every Wednesday at twelve o'clock for the discharge of business, three to be a quorum; but no grant of money shall be made at any such meeting, nor shall any business of importance be considered as fully decided upon until confirmed at a subsequent monthly meeting.

13. The meeting on the first Wednesday in every month shall be the monthly meeting, five to be a quorum, when the general business of the Society shall be transacted, grants of money made, reports of sub-committees considered and confirmed, if approved.

14. At all meetings of the committee when the quorum is assembled

in the absence of the President, the Trustee, or Vice-President of the highest rank shall take the chair. If no Trustee or Vice-President be present, the meeting will elect their chairman.

15. The first business at each meeting of the committee to be the reading of the minutes of the preceding meeting.

16. In case of an equality of votes, the question to be decided by the casting vote of the chairman.

17. All drafts for money shall be signed by the chairman of the committee and countersigned by one of the Trustees and the Secretary, but only on the recommendation of the Committee of Finance.

18. The Committee may at any monthly meeting discontinue the weekly meetings of the Committee for any period not exceeding two months.

19. No prizes shall be allotted except at the monthly meetings in May, June, and July.

20. No rule or bye-law shall be altered unless due notice of such change shall be given at a meeting of the Committee, and carried at the two subsequent monthly meetings.

21. Subscriptions are paid in advance, and are due on January 1st; but subscribers elected in December are liable only for the year ensuing.

22. It is a fundamental rule of the Society, that no question shall be discussed, at any of its meetings, of a political tendency, or which shall refer to any matter to be brought forward or pending in either of the Houses of Parliament.

RULES OF COMPETITION FOR PRIZES.

1. That all information contained in prize essays shall be founded on experience or observation, and not on simple reference to books, or other sources.

2. That drawings, specimens, or models shall accompany writings requiring them.

3. That all competitors shall transmit a sealed note, containing their names and addresses, with a motto on it to correspond with one inscribed on the essay.

4. That the Society shall have the power to publish the whole or any part of the essays which gain the prizes, and the other essays will be returned on the application of the writers.

5. That the Society is not bound to give an award, unless they consider one of the essays worthy of a prize.

6. That, in all reports of experiments, the expences shall be accurately detailed.

7. That only the imperial weights and measures are those by which calculations are to be made.

8. That no prize be given for any essay which has been already in print.

9. That prizes may be taken in money or plate at the option of the successful candidate.

All Essays must be sent to the Secretary, 5, *Cavendish Square.*

ESSAYS AND REPORTS ON VARIOUS SUBJECTS.

I.—Premiums for 1840.

PRIZE ESSAYS.

1. Storing Turnips.

Ten Sovereigns will be given for an account, founded on experience, of the best mode of Storing Turnips, by which they may be preserved in their natural state till the April or May succeeding the time of their being taken up.

Competitors are required to state—

1. Their experience of the methods now in practice for Storing Turnips, viz., on the surface of the soil, in pits, in sheds, or in houses.
2. The different sorts of covering, and their thickness.
3. The depth of pits.
4. The relative keeping virtues of different species, whether of Swedes or of common turnips.
5. The best modes of taking up and cleaning, with reference to their preservation.
6. Any new methods recommended.

2. Admixture of Soils.

Twenty Sovereigns will be given for the best account of the Transposition and Admixture of Soils, as in the application of a clay dressing to a light sand.

Competitors must state the results of actual experiments.

3. Early Spring Feed.

Twenty Pounds will be given for the best Essay on the Grasses and Leguminous Plants best adapted to arable cultivation for early feed in the spring.

The points of comparison to which the Society would wish the attention of competitors for this prize to be mainly directed are the following—

1. Earliness of vegetation.
2. Power of resisting severe frost.
3. Abundance of produce.
4. Nutritive quality.
5. Effect on the soil and on the succeeding crop.
6. The method of cultivation.

The species or variety of the plants sown should be accurately designated, and also the quality of the soil on which they have been grown.

4. Insects Injurious to Cereal Crops.

Twenty Pounds will be given for the best account of the Insects prejudicial to the Cereal Crops:—viz., wheat, barley, oats, and rye, in their different stages of growth. The descriptions of the insects must be entomological, and any remedies proposed must be the result of actual experiment.

5. Plantations.

The Gold Medal will be given for the best account of the Forest Trees best fitted for plantations in England.

Competitors must state—

1. The trees best suited to various soils of inferior description, distinguishing each sort as clay, peat, chalk, sand.
2. Whether the trees should be mixed together or in separate masses.
3. The best mode of planting, and expence.

6. Underwood.

The Gold Medal will be given for the best account of the Cultivation and Management of Underwood founded upon actual experiment.

Competitors are required to state—

1. The nature of the soil, and, when it has been recently planted, the mode of preparing it.
2. The average number of plants per acre.
3. The description of underwood growing.
4. The best sorts to be planted.
5. The cost of fencing and draining.
6. The comparative produce of not less than five acres under the common, and under an improved system of management.

7. Rotation of Crops.

Ten Sovereigns will be given for an account of the Rotation of Crops best suited to heavy lands.

The object of this inquiry will be, the combination, within a given period, of the greatest number of crops, including winter or half-crops consumed before they arrive at maturity, with profitable return, and with improvement of the condition of the soil.

8. Weeds in Meadows.

Twenty Sovereigns will be given for the best account of the Weeds in Meadows and Pastures.

Competitors must state—

1. What weeds are found in old pastures and in newly laid down grasses respectively.
2. The effect of these weeds on the animals which feed on them.
3. More particularly the effect on the milk of cows, and on the butter and cheese produced from that milk.
4. The comparative value of the butter and cheese from pastures and artificial grasses infested with weeds, and from those which are clear of them.
5. The best mode of eradicating such weeds from pastures, from meadows and from artificial grasses.

9. Gypsum as a Manure.

Ten Sovereigns will be given for the best account of the application of Gypsum as a Manure to artificial Grasses; stating—

1. The period and mode of application.
2. The state of the crop and nature of the grass.
3. The comparative produce of crops to which gypsum has, and has not, been applied.

10. Diseases of Wheat.

Fifteen Sovereigns will be given for the best Essay on Smut, Mildew, and Diseases affecting the Crop in its more advanced stages.

1. How far derivable from internal or external causes.
2. First intimation of their presence, under what circumstances, and in what soils they are most prevalent.
3. How far prevented by preparation of soil or seed.
4. What treatment is recommended to arrest their progress.

These Essays must be sent in to the Secretary on or before March 1, 1840.

AGRICULTURAL IMPLEMENTS.

1. Gorse-Crushing Machine.

Twenty Sovereigns will be given for the cheapest and most effective Gorse-Crushing Machine.

1. The machine produced must be on a working scale, and at a cost that will be attainable by the occupiers of the smallest farms.
2. It must be capable of reducing the material to a pulpy state for the mastication of ruminating animals, as cows and sheep.

2. Any Implement.

For the invention of any new Agricultural Implement, such sum as the Society may think proper to award.

AGRICULTURAL OPERATIONS.

Subsoil Plough.

Twenty Sovereigns will be given for the most satisfactory application of the Subsoil Plough to the improvement of land, whether for the purpose of correcting excessive moisture or dryness of soil.

The Society will require from competitors—

1. An accurate description of the plough used; and
2. Of the quality and state of soil and subsoil, with an estimate of its annual value before the commencement of the operation.
3. An account of the drains cut (if any), their depth and distance from each other.

4. A detailed statement of the subsoil and other ploughings to which the grounds have been subjected.
5. An account of any manure expended.
6. Of the bulk of produce of each crop.
7. Of the total expence of the operation so far as it has proceeded, and
8. An authentic estimate of the improved value of the land resulting therefrom.

CATTLE.

Prizes for Improving the Breed of Cattle.

Class I.—Short-Horns.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1838, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer	Ten Sovereigns.
6. To the owner of the best Bull Calf	Ten Sovereigns.

Class II.—Herefords.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1338, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer	Ten Sovereigns.
6. To the owner of the best Bull Calf	Ten Sovereigns.

Class III.—Devons.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1838, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer	Ten Sovereigns.
6. To the owner of the best Bull Calf	Ten Sovereigns.

CLASS IV.—CATTLE OF ANY BREED OR CROSS,

Not qualified for the foregoing Classes

1. To the owner of the best Bull calved previously to the 1st of January, 1838 . . .	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1838, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk . .	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer .	Ten Sovereigns.
6. To the owner of the best Bull Calf . .	Ten Sovereigns.

CLASS V.—HORSES.

1. To the owner of the best Cart Stallion . .	Twenty Sovereigns.
2. To the owner of the best Cart Mare and Foal.	Ten Sovereigns.
3. To the owner of the best Stallion for breeding hunters, carriage-horses, or roadsters, which shall have served mares during the season of 1840, at a price not exceeding 3*l*. each .	Thirty Sovereigns.

SHEEP.

Prizes for Improving the Breed of Sheep.

CLASS VI.—LEICESTER.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second-best ditto . .	Ten Sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

CLASS VII.—SOUTH DOWNS, OR OTHER SHORT-WOOLLED SHEEP.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second-best ditto . .	Ten Sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

Class VIII.—Long-woolled Sheep,

Not qualified to compete for Class VI.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second-best ditto . .	Ten sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

N.B.—The Sheep exhibited for any of the above Prizes must not be shorn before the 1st of May, nor after the 1st July, 1840.

Class IX.—Pigs.

1. To the owner of the best Boar . . .	Ten Sovereigns.
2. To the owner of the best Sow	Five Sovereigns.
3. To the owner of the best pen of 3 Pigs of the same litter, above 4 and under 9 months old.	Ten Sovereigns.

Class X.—Extra Stock, Implements, Roots, and Seeds.

For Extra Stock of any kind, not shown for any of the above Prizes, and for Implements, Roots, Seeds, &c., Prizes will be awarded and apportioned, by the Committee and Judges, to the value, in the whole, of	Fifty Sovereigns.

SEED WHEAT.

To the Exhibitor at the Cambridge Meeting of the best 12 bushels of White Wheat, of the harvest of 1839, grown by himself . . .	Fifty Sovereigns.
To the Exhibitor at the Cambridge Meeting of the best 12 bushels of Red Wheat, of the harvest of 1839, grown by himself	Fifty Sovereigns.

Each of these 12 bushels will be sealed by the Judges; and a thirteenth bushel of each of the same varieties will be exhibited, as a sample, to the public.

N.B.—These Prizes will be awarded at the General Meeting in December, 1841.

The two best samples, without distinguishing between the two, will be selected by Judges appointed at the Cambridge Meeting, and will be sown in the Autumn of 1840, by three farmers, under the direction of the English Agricultural Society, who will make their Report, upon which the Prize will be awarded. Ten Sovereigns will be given to the Exhibitor of the one of these two samples who shall not obtain the Prize; or, if from the produce when sown neither of the two shall appear to deserve a Prize, Ten Sovereigns will be given to the Exhibitors of each.

GENERAL REGULATIONS.

No Stock can be admitted for exhibition unless the necessary Certificates, in the form prescribed, and signed by the Exhibitor in the manner directed, be delivered to the Secretary, or sent post paid, so as to reach the Society's Rooms, 5, Cavendish-square, on or before the 1st July next.

The name and residence of the Breeders of all animals exhibited, when known, should be stated.

Non-Subscribers to pay five shillings for every head or lot of live stock before obtaining a ticket of permission to bring their cattle into the Show-yard.

The same animal cannot be entered for two classes.

The age of animals, in all cases, to be computed from the day of birth.

The sheep exhibited for any of the prizes must not be shorn before the 1st May, nor after the 1st July, 1840.

Persons intending to exhibit Extra Stock must give notice to the Secretary, on or before the 1st July next.

Stock of every description must be in the Show-yard before Eight o'clock on the morning of exhibition, and will remain in the charge of the Society until four o'clock on the afternoon of the following day.

No animal can be removed during the Show without leave.

Whenever reference is made to weights or measures, it is to be considered that the Imperial weights and measures are alone referred to.

Persons intending to exhibit Implements, Roots, Seeds, &c., must give notice of their intention to the Secretary, and furnish him with a description, at least one week before the show; and all such Implements, Roots, Seeds, &c., must be brought to the Show-yard on the day previous to exhibition.

Persons wishing to enter into any Sweepstakes should apprize the Secretary of their intention.

II.—Premiums for 1841.

REPORTS OF EXPERIMENTS.

1. Varieties of Wheat.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best Report on the Comparative Merits of different Varieties of Wheat.

Competitors will be required to state—

1. Preparation and quantity of the seed; time and method of sowing; relation to preceding and following crops; nature of the soil.
2. Power to withstand severe winters.
3. Time of flowering and of maturity.
4. Tendency to degenerate, and liability to disease.

5. Amount of produce in grain and straw, and the relative quantities of flour and offal.
6. Quantity of bread produced from 18 lbs. of flour, according to the process described by Colonel Le Couteur, in the present Number of the Journal for 1839, page 115.

Not less than a quarter of an acre to be planted with each variety.—It would be desirable that competitors should consult Colonel Le Couteur's Work upon Wheat.

2. Varieties of Barley.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best Report on the Comparative Merits of different Varieties of Barley.

Competitors will be required to state—

1. Preparation and quantity of the seed; time and method of sowing; relation to preceding and following crops; nature of the soil.
2. Power to withstand drought or extreme wet.
3. Tendency to degenerate, and liability to disease.
4. Time of flowering and of maturity.
5. Amount of produce in grain and straw.
6. Malting qualities.

3. Varieties of Turnips.

Ten Sovereigns, or a Piece of Plate of that value, will be given for the best Report on the Comparative Merits of different Varieties of Turnips.

Competitors will be required to state—

1. The comparative produce per acre of each variety treated of.
2. The nutritive qualities as compared with weight; distinguishing—
   (*a*) The varieties possessing early maturity appropriate for autumn stocking;
   (*b*) The more productive and nutritive kinds for general feeding; and,
   (*c*) The more hardy varieties for spring and late consumption.

4. Effects on subsequent Crops of Wheat.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best Account of the Comparative Effects of Crops of Beans, Clover, Vetches, Potatoes, Rye-grass, or any other crop, upon a subsequent crop of Wheat.

Competitors must state—

1. The soil on which the experiment was tried.
2. The crops preceding the wheat, and the manner of cultivating it.
3. The quantity of manure applied.
4. Whether fed or mown, and the quantity of produce if mown.
5. The species of wheat sown.
6. The manner in which the wheat was cultivated; and if manured, the quantity applied.
7. The produce in bushels of the crop of wheat.
8. Any other particulars that may seem important.

FOOD FOR LABOURERS.

Ten Sovereigns, or a Piece of Plate of that value, will be given for the best Directions to enable Labourers to prepare wholesome, nutritious, and palatable Food, in the most economical and easy manner.

As the object of the Society in offering this prize is to procure such instructions for agricultural labourers as may enable them to supply themselves with the greatest quantity of nutriment which the means at their command will produce, and to prepare a warm, comfortable, and nutritious meal for themselves and their families when they return home from their day's work ;—the Competitors for it are requested to observe:

1. That the receipts must be given in such a plain manner as may render them available to a labourer, or his wife, who are unaccustomed to cookery.
2. That the receipts must be such as may be used without requiring any apparatus which an agricultural labourer does not usually possess.
3. That they shall not require the use of any ingredients which he may not easily procure, either from his garden or in agricultural villages. This condition is not intended to preclude the recommendation of fish as a part of any dish.
4. The cost of the different dishes for which receipts are given must be accurately stated.

ON MANURES AND SOILS.

1. Application of Lime.

Ten Sovereigns, or a Piece of Plate of that value, will be given for the best Account of Experiments on the application of Lime as a manure.

The Competitors will be required to state—

1. How many years they have used lime as a manure.
2. How many acres they have limed each year.
3. What quantity they have put on per acre.
4. On what sort of soil.
5. At what time of the year.
6. For what crop.
7. Whether with or without manure.
8. In what manner applied.
9. What effect on the crop.
10. What effect on the succeeding crop.
11. The price of the lime.
12. Whether they continue to use it.
13. The chemical description of lime they use.
14. Any particulars generally with respect to lime.

2. Nitre and Cubic Nitre.

Twenty Sovereigns, or a Piece of Plate of that value, will be given

for the best Account of Experiments on the application of Nitres as Manures, including Saltpetre (the nitrate of potash) and Cubic Nitre (the nitrate of soda).

Competitors will be required to state—

1. The quantity and mode of these applications, whether used before sowing, along with the seed, or after the blade is up.
2. Every particular of each experiment; and a comparison made with the same quantity of ground sown both without manure and also with common yard-dung; stating the value of the manure in every case.
3. The result at different periods of the growth.
4. The conclusion come to from the experiments.
5. Not less than a quarter of an acre to be taken for each experiment; and to be varied as much as possible.

3. Improvement of Peat-Soils.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best Essay or Report on the most successful means by which the Improvement of Peat Soils may be effected.

Competitors will be required to state the following particulars:—

1. Description of the mode, so far as it can be ascertained, in which the peat has been formed, whether by rain-water lodging on the surface, the oozing of springs, or under a body of stagnant water.
2. Description of the plants, from the decay of which the peat appears to be formed, and of the state of decomposition in which they are found.
3. Chemical account of any acid or bitter principle injurious to vegetation which may be found in the peat.
4. Account of any substances applied to the peat, either for correcting its chemical defects or improving its consistence.
5. Level of the water in the neighbouring ditches in winter and summer.
6. General treatment and mode of cropping.

N.B.—General Conditions for all Experiments on Soils or Manures.

1. The nature and depth of the soil.

2. The proportions of clay, sand, lime, or other substances, of which the soils are composed: or, otherwise, to send specimens of the soils (in quantities of a pound or pint of each variety) to the Secretary, on his application for them.

3. The nature of the subsoil.

4. When the ground is not level, the degree in which it slopes, and the direction (north, east, &c.) of its inclination, as found by the compass.

5. The two or three preceding crops; the manure put on for them, and the produce of these crops.

ON AGRICULTURAL OPERATIONS AND IMPLEMENTS.

1. Subsoil and Trench Ploughing.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the most satisfactory Experiment on the Comparative Merits of the two processes of Subsoil and Trench Ploughing.

The Society will require from Competitors—

1. An accurate description of the ploughs used.
2. Of the quality and state of soil and subsoil, with an estimate of its annual value before the commencement of the operation.
3. An account of the drains cut (if any), their depth and distance from each other.
4. A detailed statement of the subsoil and other ploughings to which the grounds have been subjected.
5. An account of any manure expended.
6. Of the bulk of produce of each crop.
7. Of the total expence of the operation, so far as it has proceeded; and,
8. An authentic estimate of the improved value of the land resulting therefrom.

As the object of the Society is to ascertain, as far as possible, the advantages of subsoil ploughing (in which the subsoil is divided by the plough, but left in its original situation), and of trench ploughing (in which the subsoil is not only divided, but is also brought to the surface), they strongly recommend to competitors that the two processes should be conducted on a piece of ground fairly divided into two lots of equal quality, and that the drains cut in each lot, as well as any assistance afforded by manure, should be similar on each of the lots.

2. Single-horse Carts.

Ten Sovereigns, or a Piece of Plate of that value, will be given for the most satisfactory account of any experiments to compare the relative advantages of the single-horse carts which are generally used in Scotland with any mode of conveying agricultural produce which is practised in any part of England, or in any foreign country; having regard to economy of labour both of men and animals, quickness of work, and facility in loading and conducting the carriage.

3. Agricultural Mechanics.

Fifty Sovereigns, or a Piece of Plate of that value, will be given for the best Essay on the Present State of Agricultural Mechanics, and on the Improvement of which the various Implements now in use may be susceptible.

These Essays must be sent in to the Secretary on or before March 1st, 1841.

DONATIONS OF BOOKS.

Titles of Books.	*Donors.*
Highland and Agricultural Society of Scotland: Royal Warrant and new Supplementary Charter. 4to. Edinb. 1834	The Highland Society.
——— Premiums offered in 1839. 8vo. . .	The same.
——— Quarterly Journal of Agriculture, and the Prize Essays and Transactions. Nos. 40 to 46. 8vo. Edinb. 1838-9	The same.
Yorkshire Agricultural Society: General Statement, Award of Premiums, Prize Reports, &c., for 1838. 8vo. Lond. 1838	J. Walbanke Childers, Esq., M.P.
Surrey Agricultural Association: Report, List of Members, Prizes, &c., for 1837. 12mo. (and 3 fol. sheets). Epsom. 1837	The Society.
Wiltshire Agricultural Society: General Rules and Orders, Officers and Members, Premiums, &c. 12mo. Salisbury. 1825	John Benett, Esq., M.P., President.
Manchester Agricultural Society: Premiums, Rules, Officers, and Members, for 1834. 8vo. Manchester. 1834 .	The Society.
Chippenham Agricultural Association: Rules, Orders, Premiums, and List of Members, for 1838. 8vo. Chippenham. 1838	The Society.
West Devon and East Cornwall Agricultural Society: Rules, Orders, Premiums, Members, &c., for 1835. 8vo. Launceston. 1835	The Society.
Jersey Agricultural and Horticultural Society: Annual Reports for 1837 and 1838. 8vo. Jersey. 1837-8 .	Col. Le Couteur.
Agricultural and Horticultural Society of India: Annual Report for 1838, and Proceedings of Jan. and Feb., 1839. 8vo. Calcutta. 1839	The Society.
Evans and Ruffy's Farmer's Journal, and Agricultural Advertiser, Weekly Newspaper, the series extending (with the exception of deficient Numbers) from 1812 to 1832	Clark Hillyard, Esq.
The Farmer's Magazine and Monthly Journal of Proceedings affecting the Agricultural Interest, Jan. to July. 1839. 8vo. London. 1839	William Shaw, Esq.
The Veterinarian, or Monthly Journal of Veterinary Science, for June, July, September, 1839	Wm. Youatt, Esq.

Titles of Books.	*Donors.*
Labourer's Friend Magazine, Nov., 1834; Nov., 1835; Dec., 1836; Oct., Nov., 1837; Jan. to Oct., 1838; Jan. to Sept., 1839. 8vo. London. 1834-9.	THE LABOURER'S FRIEND SOCIETY.
Horticultural Society of London: Transactions of the Society, Old Series, Vol. I. to VII.; New Series, Vol. I., and of Vol. II. Parts 1 to 4. 4to. London. 1820-39 ——— Proceedings of the Society, Nos. I. to IV. 8vo. 1838 ——— List of Members. 4to. 1837	THE HORTICULTURAL SOCIETY.
Geological Society of London.—Proceedings of the Society. No. 60. 8vo. Lond. 1839	THE SOCIETY.
Royal Asiatic Society of Great Britain and Ireland.—Journal of the Society, No. III. 8vo. Lond. 1835. Proceedings of the Society, March 19 and May 7, 1836; April 8, May 26, June 16, and Aug. 5, 1837. 8vo. Lond. 1836-7.	THE SOCIETY.
Royal Geographical Society of London.—Journal of the Society, Vol. VIII., Part 2. 8vo. Lond. 1838	THE SOCIETY.
Statistical Society of London.—Journal of the Society, Nos. 1 to 12 (excepting No. 7). 8vo. Lond. 1838-9.——Quarterly Journal of the Society, Vol. II., Part 4. 8vo. Lond. (July) 1839	THE SOCIETY.
Institution of Civil Engineers.—Minutes of Proceedings: Session of 1839. 8vo. Lond. 1839.——Charter, Bye-Laws, and Regulations. 8vo. Lond. 1839	THE INSTITUTION.
College for Civil Engineers.—Prospectus. 8vo. Lond. 1839	THE DIRECTOR.
Society of Land-Agents and Surveyors.—Rules, Regulations, Bye-Laws, and Syllabus of Objects. 8vo. Lond. 1837.	THE SOCIETY.
Winkfield School of Industry.—Report for 1838; with Rules and Regulations. 8vo. Windsor. 1839.	THE REV. W. L. RHAM, M.A.
The Farmer's Guide in Hiring and Stocking Farms. By the Author of "The Farmer's Letters" (Arthur Young). 2 vols. 8vo. Lond. 1770	JOHN YELLOLY, M.D. F.R.S.
Practical Agriculture. By R. W. Dickson, M.D. 2 vols. 4to. Lond. 1805	T. RAYMOND BARKER, ESQ.
Flemish Husbandry (Libr. Useful Knowl.), No. 1. 8vo. Lond. 1837	THE AUTHOR.
On the Nature and Property of Soils. By John Morton. 12mo. Lond. 1838	THE AUTHOR.
Hortus Gramineus Woburnensis, 4th Ed. (including "Weeds of Agriculture.") By George Sinclair, F.L.S. F.H.S. 8vo. Lond. 1839	MESSRS. RIDGWAY.
The Forest Planter and Pruner's Assistant. By James Main, A.L.S. 12mo. Lond. 1839	THE SAME.
A Treatise on the Breeding, Rearing, and Fattening of Poultry. By the same. 12mo. Lond. 1839	THE SAME.

Titles of Books.	*Donors.*
Doncaster Agricultural Association.—Report of the Committee on the Advantages of Mangel Wurtzel as a Fallow Crop. 8vo. Lond. 1830	J. Walbanke Childers, Esq., M.P.
Remarks on Thorough-Draining and Deep-Ploughing. By James Smith, Esq., of Deanston Works. (From Report of Drummond's Agric. Museum.) 8vo. Stirling. 1837.	Messrs. Drummond, of Stirling.
Some Account of the Employment of Spade-Husbandry on an extensive Scale in the County of Norfolk. By John Yelloly, M.D., F.R.S. 8vo. Lond. 1838	The Author.
A Practical Essay on Milking. By William Blurton, of Field Hall, Uttoxeter. 8vo. Lond. 1839	The Author.
Observations on the Anatomy, Habits, and Economy of *Athalia Centifoliæ*, the Saw-fly of the Turnip. (Prize Essay.) By George Newport, Esq., M.R.C.S., M.E.S. 8vo. Lond. 1838	The Author.
The Cottager's Bee-Book; founded on 20 years' experience. By Richard Smith. 12mo. Oxford. 1839	The Author.
Statement respecting the "Trotsworth Liquid Manure." By G. Kimberley. (Sheet) Folio. Egham. 1838	The Author.
Statement respecting the "Rohan Potatoe." By the same. (Sheet) 4to. Egham. 1838	The Author.
State and Prospects of British Agriculture; being a Compendium of the Evidence given before a Committee of the House of Commons appointed in 1836 to inquire into Agricultural Distress. With a few Introductory Observations. By William Hutt, Esq., M.P. 8vo. Lond. 1837.	J. Walbanke Childers, Esq., M.P.
Recent Measures for the Promotion of Education in England. Eighth Edition. 8vo. Lond. 1839	Messrs. Ridgway.
Substance of Lord John Russell's Speech on the Government Plan of National Education. Seventh Ed. 8vo. Lond. 1839.	The same.
Substance of the Marquess of Lansdowne's Speech on the same Question. Seventh Ed. 8vo. Lond. 1839	The same.
On Infant Schools of Horticulture and Agriculture in France; Hints for National-School Masters; on Tanks; on Bee-keeping; and on keeping a Cow. (Anonymous.) 8vo. Lond. 1839	The Editor.
Extract from the Rev. W. S. Cotton's Short Letter to Cottagers. 12mo. Hailsham. 1838	The same.
Address to Agriculturists on Provincial Establishments for making cheap Salt from Sea-water. By R. Cort. 8vo. Lond. 1838	The Author.
On the United Application of particular Patents for manufacturing Salt, with an Essay on the Value of the Article. 8vo. Lond. 1838	The Author.

Titles of Books.	*Donors.*
On the most Profitable Plans of Agriculture and Grazing; with Remarks on the Poor Rates, Employment of the Poor, &c.; and on the Destruction of the Black Palmer. By an Experienced Farmer (Thomas Cosons, of Ropley, near Alresford, Hants.) Second Ed. 8vo. Lond. 1837	The Author
On the Improvement of Agriculture by Management of the Farinaceous Seeds and Pulse; with Outlines of a Plan to establish an Agricultural School of Industry. By Henry Hiort. 8vo. Lond. 1832	The Author.
Plan for Regulating the Rent of Land in Scotland; with safe Principles for Leases. Third Ed. (Anonymous.) 8vo. Edinb. 1834	The Author.
Importance of Agriculture to a State; and the Necessity and Principles of its Protection. By Donald Bain, Accountant, Edinburgh. 8vo. Lond. 1834	The Author.
New Medical Discoveries; with a Defence of the Linnæan Doctrine, and a Translation of Linnæus's Vegetable Materia Medica. By Charles Whitlaw. 8vo. Lond. 1829	The Author.
On the Causes and Effects of Inflammation, Fever, Cancer, Scrofula, and Nervous Affections; with Observations on Linnæus's Classification of Diseases. By the same. 8vo. Lond. 1831	The same.
Restorative for the rapidly declining Prosperity of the British Empire. (Anonymous.) 8vo. Lond.	Mr. George Whitley.
Observations on the Advantages of Joint-Stock Banks. (Anonymous.) 8vo. Cardiff. 1835	The Author.
Paris.—Bulletin des Séances de la Société Royale et Centrale d'Agriculture de Paris: Compte Rendu Mensuel, rédigé par M. Soulange Bodin. 12 livraisons (1837-8-9). 8vo. Paris, 1837-9	The Society.
Nantes.—Société Royale Académique de Nantes, et du Département de la Loire-Inférieur. Séance Extraordinaire, du 14 Mai, 1839.—Aperçus Statistiques. 8vo. Nantes, 1839	Sir John Herschel, Bart.
La Propagateur de l'Industrie de la Soie en France. Tome I. Premier Cahier. 8vo. Rodez. 1838	M. Amans Carrier.
Monographie des Céréales de la Suisse. Par N. C. Seringe. 12mo. Berne. 1819	The Author.
Catalogue Raisonné d'un Etablissement pour la Propagation du Mûrier. 8vo. Montbrison. 1838	M. Lebon.
Réglement du Comice Agricole du Mans. 12mo. Mans. 1838	The Association.
The Cultivator: a monthly publication, devoted to Agriculture. Conducted by J. Buel, of Albany. Vol. V. and No. 1 of Vol. VI. Folio. New York, 1838-9	Francis Rotch, Esq.
Two Lithographic Prints of the Society's Dining-Room and Show-Yard at Oxford	Messrs. Dewe, of Oxford.

LIST OF GOVERNORS.

[Life-Governors are distinguished by a mark thus †.]

Names.	Town Residence.	Country Residence.
Abingdon, Earl of	Clarendon Hotel	Wytham Abbey, near Oxford
†Acland, Sir T. D. Bt., M.P., F.R.S.	10, Upp. Harley-st.	Killerton Park, Collumpton, Devon.
Adeane, Henry John . . .	. .	Babraham House, Cambridge
Alston, Rowland, M.P. . .	48, Harley-street .	Pishiobury, Sawbridgeworth, Herts.
Alston, R. Gardiner . . .	48, Harley-street .	Pishiobury, Sawbridgeworth, Herts.
Amherst, Earl	66, Grosvenor-st. .	Montreal, Seven Oaks, Kent.
†Angerstein, John	23, St. James's-sq.	Weeting Hall, Brandon Ferry, Norfolk
Antrobus, Sir Edmund, Bart..	146, Piccadilly . .	Amesbury Abbey, Salisbury, Wilts.
†Arcedeckne, Andrew . . .	1, Grosvenor-sq .	Glevering Hall, Wickham Market, Suff'k
†Astley, Sir Jacob Henry, Bart.	7, Cavendish-sq.	Melton Park, East Dereham, Norfolk
Bagge, William, M.P. . .	Carlton-club . .	Stradset Hall, Downham Market, Norf'k.
Baker, T. J. Lloyd . . .	. .	Hardwicke Court, Gloucester
†Barclay, Charles	43, Grosvenor-pl. .	Bury Hill, Dorking, Surrey
†Barclay, David	8, Belgrave-square	Eastwick Park, Leatherhead, Surrey
†Baring, Hon. William B., M.P.	12, Gt. Stanhope-st.	
Baring, Sir Thomas, Bart. .	21, Devonshire-pl.	Stratton Park, Winchester, Hants.
†Barker, John Raymond . .	. .	Fairford Park, Fairford, Glouc.
Barker, Thomas Raymond .	. .	Hambleden, Henley-on-Thames, Oxon.
†Barneby, John, M.P. . . .	34, Portman-sq.	Brockhampton House, Bromyard, Heref.
Bassett, John	12, Upp. Brook-st.	
†Beach, William	. .	
Beaufort, Duke of	22, Arlington-st.	Badminton, Cirencester, Glouc.
Bedford, Duke of	6, Belgrave-square.	The Abbey, Woburn, Beds.
Benett, John, M.P. . . .	Limmer's Hotel	Pyt House, Hindon, Wilts.
Bevell, J.	. .	
Bisshopp, James	. .	West Bury, Arundel, Sussex
Blachford, Fitz Roy . . .	. .	Osborn, Cowes, Isle of Wight, Hants.
Blake, William, F.R.S. . .	62, Portland-place	Danesbury, Welwyn, near Hertford
†Blanshard, Henry . . .	37, Gt. Ormond-st.	Kirby-in-le-Soken, Manningtree, Essex
Blount, William	12, Cumberland-st.	
Bonsor, Joseph	. .	Polesden, Great Bockham, Surrey
Boucher, John George . .	. .	Shadfield, near Wickham, Hants.
†Bowes, John, M.P. . . .	26, Charles-street .	Streatham Castle, Staindrop, Durham
Bowles, J. S.	. .	Milton Hill, Abingdon, Berks.
Bramston, Thomas Wm., M.P.	11, Hereford-street	Skreens, Chelmsford, Essex
Braybrooke, Lord	10, NwBurlingtn-st	Audley-End, Newport, Essex
Bridport, Lord	12, Wimpole-st. .	Cricket Lodge, Chard, Somersetshire
†Brooke, Peter Langford . .	. .	Mere Hall, Nether Knutsford, Cheshire
Bruges, Wm. Heald L., M.P.	3, Suffolk-street. .	Seend Lodge, Melksham, Wilts.
Buckingham, Duke of . . .	Pall Mall . . .	Stowe Park, near Buckingham
†Buller, Edward, M.P. . . .	5, Suffolk-place . .	Dilhorne Hall, Cheadle, Staffs.
Buller, T. Wentw. Capt. R.N.	37, Bryanston-sq .	
Bulteel, John C.	9, Grafton-street .	Fleet House, Yealmpton, Devon.
†Bunbury, Sir Henry Ed., Bart.	. .	Barton Hall, Bury St. Edmund's, Suff'k.
Burdett, Sir F., Bart., M.P. .	25, St. James's-pl.	Foremark, Derby

Names.	Town Residence.	Country Residence.
Burlington, Earl of, F.R.S.	10, Belgrave-square	Holker Hall, Milnthorpe, Westmoreland
Burrell, Sir C. M., Bart., M.P.	5, Richmond-ter.	Knep Castle, Horsham, Sussex
†Cambridge, His Royal Highness The Duke of	Cambridge House, Piccadilly	Kew Palace, Surrey
†Cavendish, Hon. C. C., M.P.	Burlington-ho., do.	Latimers, Chesham, Bucks.
Cayley, Sir George, Bart.	48, Albemarle-st.	High Hall, Brompton, Pickering, Yorks.
Challoner, Colonel C. Bisse	29, Portman-square	Portnall Park, Virginia Water, Surrey
Cichester, Earl of	17, Stratton-street.	Stanmer Park, Lewes, Sussex
Chichester, Sir Arthur, Bart.	. .	Youlstone, Barnstable, Devon.
†Childers, Jno. Walbanke, M.P.	Carlton Hotel	Cantley Hall, Doncaster, Yorkshire
†Christopher, Robt. Adam, M.P.	97, Eaton-place	Bloxholme Hall, Sleaford, Lincl.
Clifford, Hon. Charles Thomas	3, Vere-street	Irnham Hall, Coltersworth, Lincl.
Clive, Lt.-Col. Ed. Bolton, M.P.	18, Grafton-st.	Whitfield House, near Hereford
†Clive, Hon. Robt. Henry, M.P.	53, LwGrosvenor-st	Oakley Park, Ludlow, Salop.
Cook, William	22, St. Paul's Ch.-yd	Clapham Rise, Surrey
†Copeland, Alderman, M.P.	37, Linc.-inn-fields	The Poplars, Leyton, Essex
Cotes, John	. .	Woodcote, Shiffnal, Salop.
Crawley, Samuel, M.P.	59, Portland-place	Stockwood House, Luton, Beds.
Crompton, Sir S., Bart., M.P.	20, Suffolk-street	Woodend, Thirsk, Yorks.
Crowdy, James	. .	Highworth, Wilts.
Curteis, Edward Barrett	. .	Windmill Hill, Rye, Sussex
Curtis, W.	. .	
Dacre, Lord	2, Chesterfield-st.	The Hoo, near Welwyn, Herts
†Davenport, E. D.		Calveley, Tarporley, Cheshire
De Beauvoir, R. B.		Englefield House, Reading, Berks.
Denison, Wm. Joseph, M.P.	90, Pall-mall	Denbies, Dorking, Surrey
Denison, J. Evelyn		Assington, Tuxford, Notts.
Dickinson, Francis Henry	8, Upp. Harley-st.	King's Weston, Somerton, Somerset
Downshire, Marquess of	21, Hanover-sq.	East Hempstead Park, Bracknell, Berks
Drummond, George	11, Wilton-crescent	
Drummond, A. M.	Charing Cross	Tile House, Denham, Bucks.
Drummond, Charles	24, Grosvenor-pl.	Bower Hall, Haver Hill, Suffolk
Duffield, Thomas, M.P.	University Club	Marcham Park, Abingdon, Berks.
Dugdale, Wm. Stratford, M.P.	50, Berkeley-sq.	Blythe Hall, Coleshill, Warwickshire
Duncannon, Viscount	3, Cavendish-sq.	Roehampton, Surrey
Duncombe, Hon. Wm., M.P.	23, Cavendish-sq.	Hooton Pagnell, Doncaster, Yorks.
†Durham, Earl of	13, Cleveland-row	Lambton Castle, Durham
†Egerton, T. Wilbraham	7, St. James's-sq.	Tatton Park, Knutsford, Cheshire
Eliot, Lord, M.P.	47, Dover-street	Port Eliot, St. Germains, Cornwall
Essex, Earl of	9, Belgrave-square	Cassiobury Park, Watford, Herts.
Estcourt, Thos. H. S. B., M.P.	58, LwGrosvenor-st	New Park, Devizes, Wilts.
Estcourt, T. G. B., M.P.	41, Dover-street	Estcourt, Tetbury, Glouc.
†Etwall, Ralph, M.P.	Oxf. & Camb. Club	Andover, Hants.
Euston, Earl of, M.P.	7, Grosvenor-place	Salcey Forest, Northampton
Evans, William, M.P.	8, Knightsbrdg-ter.	Allestree Hall, near Derby
†Exeter, Marquess of	7, Albemarle-st.	Burghley House, Stamford, Linc.
†Eyre, Charles	. .	Welford House, near Newbury, Berks.
Falmouth, Earl of	2, St. James's-sq.	Tregothnan, Truro, Cornwall
Farquharson, J. J.	. .	Langton, Blandford, Dorset.
Fawkes, T. Hawkesworth		Farnley Hall, Otley, Yorkshire
Fellowes, Capt. Edward, M.P.	15, LwrBerkeley-st	Ramsey Abbey, Huntingdon
†Fitzwilliam, Earl, F.R.S.	Mortimer House	Milton, Peterborough, Northampton.
Flounders, Benjamin	. .	Yarm, Yorkshire
Foley, J. H. H.	. .	Prestend, near Droitwich, Chesh.
Fortescue, Lord, F.R.S.	. .	Dublin Castle, Ireland
Freeman, W. Peere Williams	. .	Fawley Court, Henley-on-Thames, Oxon.

Names.	Town Residence.	Country Residence.
Gibbs, Humphry	24, Half Moon-st.	Ampthill, Beds.
Gillies, Robert Maule . . .	Corn Exchange .	
Gooch, Sir Thomas S., Bart. .		Benacre Hall, Wrentham, Suffolk
Gordon, Robert, M.P. . . .	29, Dover-street .	Kemble Ho., near Cirencester, Glouc.
Grafton, Duke of	47, Clarges-street .	Euston Hall, Thetford, Norfolk
†Graham, Sir J. R., Bart., M.P.	46, Grosvenor-pl. .	Netherby, near Longtown, Cumberland
Greathead, Edward . . .	44, St. James's-pl.	Udding, nr. Ringwood, Hants.
Guest, Sir J. J., Bt., M.P., F.R.S.	13, Grosvenor-sq. .	Dowlais Ho., Merthyr-Tydvil, Glamrg.
Guise, Sir John W., Bart. .		Rendcombe Park, Cirencester, Glouc.
Hale, Robert Blagden, M.P. .	15, Bolton-st. . .	Alderley Park, near Wootton, Glouc.
†Handley, Henry, M.P. . .	30, Pall Mall . .	Culverthorpe Hall, Sleaford, Lincolnsh.
Handley, W. F.	. .	Newark-upon-Trent, Notts.
†Harcourt, George Simon, M.P.	Carlton Club . .	Ankerwycke House, Staines, Bucks.
Harland, Wm. Charles, M.P.	3, Chesterfield-st.	Sutton Hall, Easingwold, Yorks.
Hartopp, Sir Edmd. C., Bart.	169, New Bond-st.	Doe Bank, Sutton Colefield, Warw.
Hatherton, Lord	45, Grosvenor-pl. .	Teddesley Hall, Penkridge, Staffs.
Hayter, W. Goodenough, M.P.	11, Hyde Park ter.	Stoberry Park, Wells, Somerset.
Heathcoat, John, M.P. . .	6, Suffolk-street .	Bolham, Tiverton, Devon.
Heathcote, Gilbert J., M.P. .	Burlington Hotel	Stocken Hall, Grantham, Linc.
Heathcote, Sir W., Bart., M.P.	26, St. James's st.	Hursley Park, Winchester, Hants.
†Heneage, George Fieschi .	. .	Hainton Hall, Wragby, Linc.
†Herbert, Hon. Sydney, M.P. .	1, Grafton-street .	Wilton House, Salisbury
Hervey, William	. .	Bradwell Grove, Burford, Oxon.
Hewett, W. H.		
†Hill, Sir Rowland Bart., M.P.	Limmer's Hotel .	Hawkestone Hall, Whitchurch, Salop.
Hippisley, Henry		Lambourne Place, nr. Hungerford, Berks
Hodges, Thomas Law, M.P. .	16, Suffolk-street .	Hempsted Park, Cranbrook, Kent
†Holford, R. S.	43, Grosvenor-sq.	Weston Birt House, Tetbury, Glouc.
Holland, Edward	. .	Dumbleton Hall, Evesham, Worc.
Hope, Henry Thomas, M.P. .	1, Mansfield-st. .	The Deepdene, Dorking, Surrey.
Houblon, John Archer . .	10, Cumberland-pl.	Hallingbury Place, Bishop's Stortford.
†Howick, Viscount, M.P. . .	16, Whitehall-place	Howick House, Alnwick, Northumb.
Hulse, Sir Charles, Bart . .	. .	Breamore Ho., Fordingbridge, Hants.
†Hulse, Lieut.-Colonel . . .	. .	Breamore Ho., Fordingbridge, Hants.
Huntingfield, Lord . . .	. .	Heaveningham Hall, Yoxford, Suff.
†Huntingtower, Lord . . .	. .	Buckminster Park, Colsterworth, Linc.
Hurst, Robert Henry, M.P. .	68, St. James's-st.	Nuthurst Lodge, Horsham, Sussex
Hyett, W. H.	. .	Painswick House, Stroud, Glouc.
†Ilchester, Earl of	31, Old Burlngtn-st	Melbury House, Sherborne, Dorset.
Johnstone, Sir John V. B., Bt.	27, Grosvenor-sq.	Hackness, Scarborough, Yorkshire
Jones, Rev. J. P.	. .	Elm Green, Cirencester, Glouc.
Keene, Rev. C. Edmund . .	. .	Swincombe House, Wallingford, Berks.
Kensington, Lord	2, Carlton Ho. ter.	Heydon Hall, Reepham, Norfolk
†Kerrison, Lt.Gen.Sir E., Bt. M.P.	13, Gt. Stanhope-st.	Oakley Park, Eye, Suffolk
Kenyon, Lord	9, Portman-square	Gredington Hall, Whitchurch, Flints.
Knatchbull, Sir E., Bart., M.P.	71, Lower Grosv.-st.	Mersham Hatch, Ashford, Kent
Labouchere, Henry, M.P. .	27, Belgrave-sq. .	Stowey, Somersetshire
Lainson, Alderman John . .	59, Euston-square	
Langston, J. Haughton . .	143, Piccadilly .	Sarsden Ho., Chipping Norton, Oxon.
Lansdowne, Marquess of, F.R.S.	Berkeley-square .	Bowood Park, Calne, Wilts.
†Lawley, Sir Francis, Bart. .	18, Grosvenor-sq. .	Middleton Hall, Fazeley, Staffs.
†Lefevre, Charles Shaw, M.P. .	Eaton-square . .	Heckfield Pl., Hartford Bridge, Hants.
Leigh, Lord	7, Park-crescent .	Stoneleigh Abbey, Kenilworth, Warks.
Ley, John Henry	4, Richmond-ter.	Trehill, Exeter
Liverpool, Earl of . . .	Whitehall . . .	Pitchford Hall, Shrewsbury, Salop

Names.	Town Residence.	Country Residence.
†Long, Walter, M.P.	29, Hill-street .	Rood Ashton, Trowbridge, Wilts.
Lovelace, Earl of	10, St. James's-sq.	Oakham Park, Ripley, Surrey
Macclesfield, Earl of, F.R.S. .	9, Conduit-street	Sherborne Castle, Tetsworth, Oxon .
Maitland, Eben. Fuller, F.R.S.	3, Bryanstone-sq.	Henley-on-Thames, Oxon .
Maitland, W. Whitaker . .	11, Gloucester-ter.	
Mason, W. W.	. .	Linton
Maclean, Donald, M.P. . . .	24, Berkeley-sq.	King's StanleyHouse, Frocester, Dursley
Melbourne, Viscount . . .	39, South-street	Brocket Hall, Welwyn, Herts.
†Miles, Philip J.	7, Hamilton-place	Leigh Court, Bristol
†Miles, William, M.P. . . .	Ditto	King's Weston, Bristol
†Mordaunt, Sir J., Bart., M.P. .	4, Eaton-place	Walton Hall, Stratford-on-Avon, Warw.
†Moreton, Lord	2, Seymour-place	Woodchester Park, Stroud
Morgan, Sir Chas. Gould, Bart.	70, Pall Mall	Tredegar, Newport, Monmouthshire
Morland, T. T.	. .	Sheepstead, Abingdon, Berks.
†Morrison, James	57, Upp. Harley-st.	Fonthill Abbey, Hindon, Wilts.
Morton, John	. .	Chester Hill, Stroud, Glouc.
Moseley, John	. .	Glenham, Wickham Market, Suffolk
Mostyn, Lord	9, Lwr Seymour-st.	Mostyn Hall, Holywell, Flintshire
Mostyn, Hon. Ed. M. Lloyd .	9, Gt. Seymour-st.	Mostyn Hall, Holywell, Flintshire
Naper, J. W. Lennox . .	. .	Lough Crew, Oldcastle, Ireland
†Neeld, Joseph, M.P. . . .	6, Grosvenor-sq. .	Grittleton House, Chippenham, Wilts.
Noel, Hon. Charles George .	11, Chandos-st, Cav.	Exton Park, Stamford, Linc.
Norfolk, Duke of, F.R.S. .	21, St. James's-sq.	Arundel Castle, Sussex
Northampton, Marq. of, P.R.S.	145, Piccadilly .	Castle Ashby, Northampton
†Northumberland, Duke of, FRS.	Northumberlnd-ho	Alnwick Castle, Northumberland
Nurse, Wm. Mountford . .	5, Langham-pl. .	Great Cell Barns, St. Albans
Palmer, Robert, M.P. . . .	6, Charles-street. .	Holme Park, Reading, Berks.
Patten, John Wilson, M.P. .	24, Hill-street. .	Bank Hall, Warrington, Lanc.
†Peel, Sir R., Bart., M.P., F.R.S.	Whitehall Gardens	Drayton Manor House, Fazeley, Staffs.
Pegus, Rev. P. M. . . .	. .	Uffington Hall, Stamford, Lincl.
†Pendarves, E.W., M.P., F.R.S.	36, Eaton-place .	Pendarves House, Truro, Cornwall
Penruddocke, Jno. Hungerford	35, Curzon-street	Compton Park, Salisbury, Wilts.
†Percival, John	. .	Ryde, Isle of Wight
Philips, Mark, M.P. . . .	6, Vigo-street . .	The Park, Manchester
Plowden, William	. .	Plowden Castle, Ludlow, Salop.
†Popham, General	. .	Littlecot, Hungerford, Wilts.
†Portman, Lord	18, Eaton-square	Bryanston House, Blandford, Dorset.
Price, Sir Robert, Bart., M.P.	11, Stratton-street	Foxley Hall, near Hereford
†Pusey, Philip, M.P., F.R.S. .	35, Grosvenor-sq.	Pusey House, nr. Faringdon, Berkshire
Pym, Francis	35, Clarges-street	The Hasells, Biggleswade, Beds.
†Radnor, Earl of	52, Lwr Grosvr-st.	Longford Castle, Salisbury, Wil.
Rayleigh, Lord		Terling Place, Witham, Essex
†Richmond, Duke of . . .	51, Portland-place	Goodwood Park, Chichester, Sussex
Ripon, Earl of, F.R.S. . . .	1, Carlton Gardens	Nocton Hall, Lincoln
Rodd, Rev. Edward, D.D. .	. .	Trebartha Hall, Launceston, Cornwall
Rogerson, Joseph		
Rosebery, Earl of, F.R.S. .	139, Piccadilly .	Warren Wood, Hatfield, Hertfordshire
†Rutland, Duke of	7, Bolton-street .	Belvoir Castle, Grantham, Leicestershire
Salisbury, Marquess of . .	20, Arlington-st. .	Hatfield House, Herts.
†Sanford, Ed. A., M.P., F.R.S.	21, Queen-st, Mayfr	Nynehead Court, Wellington, Somerset.
Scarborough, Earl of . . .	41, South-st. . .	Sandbeck Castle, Bawtry, Yorkshire
Seymour, Henry	39, Upp. Grosvr-st.	Knoyle House, Hindon, Wilts.
Shaw, William	7, King's-rd, Bdf-rw	
Sheffield, Earl of	20, Portland-place	Sheffield Park, Uckfield, Sussex
Sherborne, Lord	17, Hyde Park-st.	Sherborne House, Northleach, Glouc.

Names.	Town Residence.	Country Residence.
Sheridan, Richard Brinsley .	9, Grosvenor-sq. .	Frampton House, Dorchester, Dorset.
Shuckburgh, Sir F., Bart. FRS.	Hans-pl., Chelsea	Shuckburgh Park, Southam, Warwicksh.
†Slaney, Robt. Aglionby, M.P..	17, Suffolk-street	Walford Manor, Shrewsbury
Smith, Jeremiah	. .	Cadbar, Rye, Sussex
†Smith, John Abel, M.P. . .	47, Belgrave-sq.	Sacombe Park, Ware, Herts.
Smith, William	. .	Prae Hill, St. Albans, ditto
†Sondes, Lord	17, St. James's-pl.	Rockingham Castle, Northamptonshire
†Spencer, Earl	27, St. James's-pl.	Althorp Park, near Northampton
Stanhope, John Spencer . .	. .	Cannon Hall, Barnsley, Yorkshire
†Stanley, Lord, M.P. . . .	8, St. James's-sq. .	Balley Kisteen, Tipperary, Ireland
Stansfield, Wm. R. C., M.P.	11, Clarges-street .	Esholt Hall, Bradford, Yorkshire
Steel, Sir Robert	15, Fludyer-street	
Stonor, Thomas	3, Tilney-street .	Stonor Park, Henley-on-Thames, Oxon.
Stracey, Sir Edw. Bart., F.R.S.	. .	Rackheath Hall, Norwich
†Stradbroke, Earl of . . .	18, Queen-street .	Henham Park, Southwold, Suffolk
†Strutt, Edward, M.P. . . .	42, South-street .	St. Helen's, near Derby
Stuckey, Vincent	126, Sloane-street	Hill House, Langport, Somersetshire
Sumner, Col. Geo. Holme, FRS.	. .	Hatchland Park, Guildford, Surrey
†Sutherland, Duke of . . .	Stafford House .	Trentham Park, Newcastle-under-Lyne
†Sutton, Sir Richard, Bart. .	. .	Norwood Park, Southwell, Notts.
†Talbot, Earl	33, Gt. George-st.	Ingestre Hall, near Stafford
Thomas, Inigo	. .	Ratton Park, Eastbourne, Sussex
Thorald, Sir John Chas., Bart.	. .	Syston Park, Grantham, Lincolnshire
Tower, Christopher Thomas .	. .	Weald Hall, Brentwood, Essex
†Townley, Rich. Greaves, M.P.	Limmer's Hotel .	Fulbourn House, near Cambridge
Tremayne, John Hearle . .	. .	Heligan, Grampound, Cornwall
Trotter, John	. .	Horton Place, near Epsom, Surrey
Vansittart, Henry	. .	Kirkleatham, Guisborough, Yorkshire
Vavasour, Hon. Sir E. M., Bart.	. .	Haslewood Hall, Tadcaster, Yorkshire
Villebois, F.	. .	Adderbury Lodge, Kingsclere, H nts.
†Wakeman, Sir Offley P., Bart.	3, Princ.-st, Han-sq	Perdiswell Park, Worcester
Wall, Ch. Baring, M.P., F.R.S.	44, Berkeley-sq. .	Norman Court, Stockbridge, Hants.
Watson, Hon. Richard . .	36, Davies-street .	Rockingham Castle, Northampton
Welby, Sir Wm. Earle, Bart.	8, Upp. Belgrave-st.	Denton House, Grantham, Lincolnshire
†Wellington, Duke of . . .	Apsley House . .	Strathfieldsaye, Hartford-bridge, Hants
†Wenlock, Lord	29, Berkeley-sq. .	Escrick Hall, Selby, Yorkshire
†Westminster, Marquess of .	33, Upp. Grosv.-st.	Eaton Hall, Chester
†Whitbread, William Henry .	76, Eaton-square .	South Hill House, near Bedford
Wilbraham, G., M.P., F.R.S.	23, Brook-street .	Delamere House, Northwich, Cheshire
Williams, William, M.P. . .	31, Pall-Mall . .	
Williams, Rev. E. H. G. . .	. .	Marlborough, Wilts.
Wilmot, E. W.	.	Rufford, Ollerton, Notts.
Wills, B.	. .	Camberwell, Surrey
†Wilson, Henry	. .	Stowlangtoft Hall, Suffolk
Wilshere, William, M.P. . .	2, I, Albany . .	Walsworth Hermitage, Hitchin, Herts.
Wingate, W. B.	.	Hareby, Bolingbroke, Lincolnshire
Wood, Col. Thomas, M.P. .	4, Cavendish-sq. .	Littleton House, Staines, Middlesex
†Worsley, Lord, M.P. . . .	12, Up. Belgrave-st.	Manby Hall, Glanford Bridge, Linc.
Wright, John	6, Henrietta-st. C G	Belsize Park, Hampstead, Middlesex
Wroughton, Bartholomew .	. .	Woolley Park, Lambourn, Berks.
†Yarborough, Earl of . . .	17, Arlington-st. .	Brocklesby Hall, Glanford Bridge, Linc.
Yorke, W.		
Youatt, William	. .	11, Adams'-terrace, Camden Town

LIST OF MEMBERS.

[Life-Members are distinguished by a mark thus †.]

Names.	Town Residence.	Country Residence.
Abbott, Thomas	. .	Aylesford, Kent
Ackland, Robert Fines	. .	Boulston, Haverford West, Pembroksh.
Acland, Thomas Dyke, M.P.	92, Jermyn-street	Holnicote, Minehead, Somersetshire
Acome, John	. .	Kidlington, Woodstock, Oxon.
Ade, Rev. John	. .	Wensley Rectory, Bedale, Yorkshire
Adey, William	. .	Chorley, Lichfield, Staffs.
Agar, Hon. G. C.	. .	Woodstock, Oxon.
Aitken —	. .	Deeping Fen, Spalding, Lincolnshire
Aldbright, N.	. .	Charltsnoy, Banbury, Berks.
Alderman, Charles	. .	Kentbury, Newbury, Berks.
Aldridge, Robert	. .	St. Leonard's Forest, Horsham, Sussex
Aldworth, W., Jun.	. .	Frilford, Abingdon, Berks.
Aldworth, J.	. .	Frilford, Abingdon, Berks.
Alexander, Wm. Maxwell	22, Upp. Grosv.-st.	Southbar, Renfrewshire
Allen, John	. .	Liskeard, Cornwall
Allen, W.	. .	Great Hendred, Wantage, Berks.
Allin, Richard	. .	Little Moor, Oxford
Allin, Richard, Jun.	. .	Sandford, Oxford
Allix, Charles	. .	Willoughby, Alford, Lincolnshire
Allpress, R. W.	. .	Burleigh Hill, St. Ives, Hants.
Almack, John, Jun.	. .	Leckonfield Park, Beverley, Yorkshire
Almack, Thomas	. .	Bishop Burton, Beverley, ditto
Almack, Barugh	10, Whitehall-pl.	
Alywin, William	. .	Thatcham, Newbury, Berks.
Ambrose, ——	. .	
Anderson, Robert	. .	Cirencester, Gloucestershire
Anderson, William	. .	Oakley, Bedford
Andrews, Edwin	. .	Shroton, Devonshire
Annesley, Arthur	89, Eaton-square	Bletchington Park, Woodstock, Oxon.
Ansell, William	. .	Wantage, Berks.
Appleby, L.	. .	
Arbuthnot, Rt. Hon. Charles	. .	Woodford Lodge, Thrapston, Northamp.
†Archbold, Robert, M.P.	55, Jermyn-street	David's Town, Castledermot, Ireland
Archer, William	. .	Horningsham, Warminster, Wilts.
Arkwright, Charles	. .	Dunstall Lodge, Burton-upon-Trent
Arkwright, Rev. Joseph	. .	Mark Hall, Harlow, Essex
Arnatt, Jonathan	. .	Leer, Witney, Oxon.
Arnitt, G.	. .	
Arnot, David Gale	. .	Wyfold Court, Henley-upon-Thames
Arnott, George	. .	Tingewick, Buckingham
Ashdown, John	. .	Uppington, Shrewsbury, Salop.
Ashurst, William Henry	. .	Waterstock House, Wheatley,
Ashurst, W. H., Jun.	. .	Waterstock House, Wheatley, Oxon.
Astbury, William	62, High-st, Cam.T	
Aston, Samuel	. .	Compton House, Newcut, Gloucester
Atkins, E. Martin	. .	Kingston-Lisle, Wantage, Berks.
Atterbury, H. S.	. .	Woburn, Bedfordshire

Names.	Town Residence.	Country Residence.
Austen, Colonel	. .	Seven Oaks, Kent
Austen, Gardner	. .	Patrick's Bourne, Canterbury, Kent
Austin, L. S.	. .	The Warren, Wootton-under-Edge
Aylesford, Earl of	50, Grosvenor-st.	Parkington Hall, Coventry, Warwicksh.
Bacon, James	. .	Pluckley, Charing, Kent
Badcock, Benjamin	. .	Broad-street, Oxford
Badcock, John	. .	Radley, Abingdon, Berks.
Baden, Andrew	. .	Long-street, Ludgershall, Wilts.
Badham, G. D.	. .	Waldringfield, Woodbridge, Suffolk
Bailey, Charles	. .	Abingdon, Berks.
Bailey, William James	. .	Shenley House, Stony Stratford, Bucks
Bailey, J.	. .	Shirley House, Stony Stratford, Bucks
Bailey, William	. .	Hursley, Winchester, Hants.
Baillie, W. H.	33, Cavendish-sq.	Duntisbourne, Cirencester, Gloucestersh.
Bailward, John	. .	Horsington, Wincanton, Somersetshire
Baines, John	8, Cleveland-row .	Goosnargh, Preston, Lancashire
Baker, Robert	. .	Writtle, Chelmsford, Essex
Baker, Richard W.	. .	Cottesmore, Oakham, Rutlandshire
Baker, Sir Edw. Baker, Bart.	. .	Ranston House, Blandford, Dorset.
Baker, T. Barwick	. .	Hardwick Court, Gloucester
Baker, Rev. Richard Hy.	. .	Linchmere, Hazlemere, Sussex
Baker, Thomas	. .	Little Rollright, Chipping-Norton, Oxon
Ballard, Rev. J.	. .	Cropredy, Banbury, Oxon.
Banger, Thomas	. .	Piddletown, Dorchester, Dorset
Bannerman, A.	. .	Chorley, Lancaster
Banting, James	. .	Oxford
Barber, Richard	. .	Charlton, Tetbury, Gloucestershire
Barclay, Wm.	. .	Haseley, Warwick
Barclay, J. P.	. .	Haseley, Warwick
Barker, George Raymond	. .	Fairford Park, Fairford, Gloucestersh.
Barlow, Rev. G. F.	. .	Burgh, Woodbridge, Suffolk
Barnard, F.	. .	Wantage, Berks.
Barnard, Richard	. .	Pusey, near Faringdon, Berks.
†Barneby, William	. .	Chater Park, Bromyard, Herefordshire
Barnett, Charles	. .	Stratton Park, Biggleswade, Beds.
Barnett, Joseph	. .	Remenham Hill, Henley-on-Thames
Barrett, Thomas	. .	Tattersfield Hall, Westerham, Kent
Barrington, Viscount, M. P.	34, South-street .	Beckett House, Faringdon, Berks.
Barter, Rev. C.	. .	Sarsden, Chipping-Norton, Oxon.
Bartlett, William	. .	Whitcombe, Dorchester, Dorset.
Bartlett, Isaac	. .	Haws, Brackley, Northamptonshire
Bartlett, John	. .	Haws, Brackley, Northamptonshire
Barton, John	. .	Threxton, Watton, Norfolk
Barton, John	. .	Lee, Havant, Hampshire
Barton, Thomas	. .	
Barton, Nathaniel	. .	Corsley House, Warminster, Wilts.
Bates, Thomas	. .	Kirkleavington, Yarm, Yorks.
Bates, Thomas Ellis	. .	Fittleton, Amesbury, Wilts.
Bathurst, Earl	8, John-st, Berk.-sq	Oakley Park, Cirencester, Glouc.
Bathurst, Hon. William L.	7, Half-moon-st.	
Batt, E. A.	. .	Witney, Oxfordshire
Bawldry, Charles	. .	Ascott, Woodbridge, Suffolk
Bawtree, John	. .	Sayer, Colchester, Essex
Baxter, Robert	. .	Doncaster, Yorkshire
Bayley, C. B.		
Bayne, William	. .	Oxford
Beach, Sir Mich. Hicks, Bart.	20, Portman-sq.	Williamstrip Park, Fairford, Gloucest.
Beach, John	. .	Redmarley, Gloucester.

Names.	Town Residence.	Country Residence.
Beadel, James	. .	Witham, Essex
Beasley, John	. .	Brampton, Northampton
Beaufort, Henry	. .	Holme, Biggleswade, Beds.
Beaumont, E. B.	. .	Firmingley, Bawtry, Notts.
Beck, William	. .	Mileham, East Dereham, Norfolk
Beck, Edward	. .	Harpley, Castle Rising, Norfolk
Beckett, W.	. .	Kirkstall Grange, Leeds, Yorkshire
Bedford, John	. .	Boughton House, Lincolnshire
Beldam, Valentine	. .	Royston, Herts.
Beman, Robert	. .	Donnington, Moreton-in-Marsh, Glouc.
Bennett, James	. .	Cadbury House, Castle Carey, Somers.
Bennett, Joseph	. .	Tempsford, Biggleswade, Beds.
Bennett, Samuel	. .	Bickerings Park, Woburn, Beds.
Bennett, Thomas	. .	Woburn, Beds.
Bennett, Thomas	. .	Chaddlesworth, East Ilsley, Berks.
Bennett, William	. .	Lewsey, near Luton, Beds.
Bennett, W.	. .	Syde, Cirencester, Gloucestershire
†Benson, Rev. H. B.	. .	Utterby House, Louth, Lincoln.
Benson, John	. .	Tavistock, Devon.
Best, Rev. T.	. .	Kirby-on-Bain, Horncastle, Lincoln.
Bethell, Henry	. .	Enford, Pewsey, Wilts.
Bethune, Edward Drinkwater	80, Chester-square	
Bethune, Rev. G.	. .	Worth Rectory, Crawley, Cuckfield, Sus.
Bettridge, Henry	. .	East Hanney, Abingdon, Berks.
Bettridge, R. H.	. .	Milton Hill, Abingdon, Berks.
Bicheno, Jas. Ebenezer, F.R.S.	. .	Ty-Maen, Pyle, Glamorganshire
Bigg, Thomas	15, Crawford - st.	
Binnix, J. A.	. .	West Dean, Chichester, Sussex
Binns, Jonathan	. .	
Birch, George W.	. .	
Birks, John	. .	Herringfield
Birnie, J. B.	8, St. Martin's-pl.	
Birt, Jacob	12, Myddleton-sq.	
Bisshopp, John	. .	Westburton, Petworth, Sussex
Blackbourn, David	. .	Temple Brewer, Lincolnshire
Blackett, Henry	. .	Stockburn, Darlington, Durham
Blackford, Richard	. .	Malmesbury, Wilts.
Blagrove, Edward	. .	Magdalen College, Oxford
†Blair, John	18, Calthorpe - st.	Moseley Lodge, Welford
Blake, N.	. .	Stanton Harcourt, Salop
Bland, Dr.	. .	Grantham, Lincolnshire
Bland, William	. .	Hartlip, Sittingbourne, Kent
Blandy, Adam	. .	Kingston House, Abingdon, Berks.
Blandy, T.	. .	Kingston, Bagpuze, Berks
Blandford, Marquess of	5, York-st. St. Jas.'	Howbury, Beds.
Blexam W.	. .	Modetonham
†Bliss, Rev. Philip, D.D.	. .	Oxford
Blyth, H. E.	. .	Burnham-Westgate, Norfolk
Boards, William	. .	Edmonton, Middlesex
Boby, Charles	. .	Finborough, Stowmarket, Suffolk
Bodley, John	. .	Stockley, Crediton, Devon.
Bolton, Lord	25, Berkeley-sq.	Hackwood Park, Basingstoke, Hants.
Booth, John	. .	Killerby, Catterick, Yorkshire
Boringdon, Viscount	. .	Kentchurch, Kensington, Middlesex
†Botfield, Beriah	. .	Norton Hall, Daventry, Northamptonsh.
Botfield, Thomas	. .	Hopton Court, Cleobury-Mortimer, Salp.
Botfield, William	. .	Decken Hill, Shifnal, Salop
Botley, John	. .	Stockley, Crediton, Devon.
†Bourchier, Charles	66, Wimpole-street	
Bourne, George	. .	Halton, Spilsby, Lincolnshire

Names.	Town Residence.	Country Residence.
Bouverie, Edward	. .	Delapre Abbey, Northampton
Bowley, David	. .	Cirencester, Gloucestershire
Bowley, E.	. .	Cirencester, Gloucestershire
Bowley, William	. .	Cirencester, Gloucestershire
Bowman, C.	. .	
Boys, Henry	. .	Waldersham, Dover, Kent
Boys, R.	. .	Eastbourne, Sussex
Boys, Edward	. .	Alkerton, Banbury, Oxon
Bradley, Edward	. .	Traduff, Cowbridge, Glamorganshire
Brailsford, Thomas	. .	Barkwith, Wragby, Lincolnshire
Braine, Robert	. .	Oxford
Braithwaite, Garnet	. .	Plumtree Hall, Milnthorpe, Westmorld.
Brenner, W.	. .	
Brethingham, J. C.	. .	Brockdish, Harleston, Norfolk
Bretull, R.	. .	Hales-Owen, Salop
Brewitt, Thomas	. .	Rayleigh, Essex
Breynton, John	. .	Haunch Hall, Lichfield, Staffordshire
Bridge, Thomas	. .	Buttsbury, Ingatestone, Essex
†Bright, J.	. .	Teddesley Pk. Farm, Penkridge, Staffs.
Bristow, S. E.	. .	Burthorp House, Newark, Notts.
Broadwood, J. S.	. .	Lyne, Dorking, Surrey
Bromhead, Benjamin	. .	Lincoln
Bromley, R. Maddox	. .	Meopham, Rochester, Kent
Bromwell, Rev. R.	. .	Pembroke College, Oxford
†Brooke, Sir Richard, Bart.	. .	Norton Priory, Runcorn, Cheshire
Brooks, John	. .	Hatford, Faringdon, Berkshire
Brooks, T.	. .	Croxby, Cambridgeshire
Brooks, Bernard	. .	Lyford, Wantage, Berkshire
Brown, Charles	. .	Redbourn, St. Alban's, Hertfordshire
Brown, Francis	. .	Welbourne, Sleaford, Lincolnshire
Brown, George	. .	Avebury, Marlborough, Wiltshire
Brown, George	. .	Avebury, Marlborough, Wiltshire
Brown, J.	. .	Pamphill Ho., Wimborne Minster, Dors.
Brown, John	. .	Compton, Ibsley, Ringwood, Hants
†Brown, Rev. H.	. .	Burton, Sleaford, Lincolnshire
Brown, Rev. Robert	. .	Kidlington, Woodstock, Oxon
Brown, T.	. .	
Brown, Thomas	. .	Bartenbury Ho., Cirencester, Glouces.
Brown, Thomas	. .	South Fairly, Wantage, Berkshire
Brown, William	. .	Lockinge, Wantage, Berkshire
Browne, W. R.	. .	Chilton
Browne, John	11, O. Cavendish-st	Chisledon, Swindon, Wiltshire
Browne, Rev. Robert	. .	
Browning, Jonathan	. .	Oxford
Brunner, William	. .	Oxford
Bryant, William	. .	Newmarket, Cambridgeshire
Bubb, Anthony	. .	Witcombe, Gloucestershire
Buckland, Rev. W., D.D., F.R.S.	. .	Christchurch, Oxford
Buckley, John	. .	Normanton Hill, Loughborough, Leic.
Budd, Captain H., R. N.	. .	Winterbourne Basset, Marlbro', Wilts.
Bulford, Thomas	. .	Studley, Oxford
†Buller, John	. .	Morsal, Looe, Cornwall
†Bullock, Ferdinand	. .	East Challow, Wantage, Berkshire
Bulwer, William Lytton	. .	Heydon Hall, Reepham, Norfolk
Bunnett, Thomas	. .	
Burd, Timotheus	. .	Whiston Priory, Salop.
Burder, D.	. .	Abingdon, Berkshire
Burford, Thomas	. .	
Burgess, Robert	. .	Winterbourne Bassett, Marlbro', Wilts.
Burke, French	84, Gower-st., B.sq	

Names.	Town Residence.	Country Residence.
Burn, Ilderton	21, Connaught-sq.	
Burnand, William	. .	Norton, Chichester, Sussex
Burness, C.	. .	
Burrows, T., Jun.	. .	Haddington, Oxford
Burt, Thomas	. .	Iwerne, Blandford, Dorsetshire
Burt, William	. .	Witchampton, Wimborne-minster, Dst.
Burt, A.	. .	Witchampton, Wimborne-minster, Dst.
Burt, George	. .	Whitsbury, Wiltshire
Burton, Launcelot Archer	. .	Grove End House, St. John's Wood
Burtt, James	. .	Clenston
Bury, John W.	20, Devon.-st, Pt.-pl	
Butcher, W.	. .	Standish, Stroud, Gloucestershire
Butterfield, John	. .	Haws, Brackley, Northamptonshire
Cadle, Joseph	. .	Westbury-on-Severn, Gloucestershire
†Calcraft, John Hales, M.P.	12, Carlton-terrace	Corfe Castle, Dorset
†Caldecott, Thomas	. .	Rugby Lodge, Rugby, Warwickshire
Caldecote, R. M.	. .	Eastbourne, Sussex
Caley, Digby	. .	Ripon, Yorkshire
Calhoun, Walter F.	. .	Binderton, Midhurst, Sussex
Calthorp, Richard	. .	Swinehead Abbey, Boston, Lincolnshire
Calverley, Thomas	1, Regent-street	Ewell House, Ewell, Surrey
Calvert, John W., M.D.	11, Blandf.-pl.R.P.	
†Calvert, Frederick	. .	Claydon House, Winslow, Bucks.
Calvert, Edmund	. .	Hunsdon, Ware
Calvert, N.	. .	Hunsdon, Ware, Herts.
Cannon, J. S.	. .	Beckley, Oxford
Capel, William	. .	Grove, Stroud, Gloucestershire
Capper, Mrs.	. .	Hailsham House, Hailsham, Sussex
†Carew, W. H. Pole	. .	Antony House, Devonport, Devon.
Cary, Rev. H.	. .	Cowley House, near Oxford
Carnegie, Rev. J.	. .	Seaford, Sussex
Carrington, Geo., Jun.	. .	The Abbey, Great Missenden, Bucks.
Carrington, Lord	. .	The Abbey, High Wycombe, Bucks.
Carter, J. Thomas	. .	Hunstanton, Lynn, Norfolk
Carter, J. R.	. .	Spalding, Lincolnshire
†Cartwright, Thomas W.	. .	Ragnall Hall, Newton-on-Trent, Notts.
Casson, —	. .	Ditchley Park, near Woodstock, Oxon.
Castle, Benjamin	. .	Oxford
Castree, J.	. .	Gloucester
Catlin, Thomas W.	. .	Chillesford, Orford, Suffolk
†Cator, Rev. Thomas	. .	Skelbrooke Park, Doncaster, Yorksh.
Caudwell, William	. .	Drayton, Abingdon, Berks.
Cavendish, Hon. Geo. H., M.P.	. .	Ashford Hall, Bakewell, Derbyshire
Cayley, Ed. Stillingfleet, M.P.	. .	Wydale, Malton, Yorkshire
Chamberlain, H.	. .	Disford, Leicestershire
Champion, Thomas A.	. .	Sarr, near Canterbury, Kent
Chandler, Thomas	. .	Stockton-upon-Tees, Durham
Chapman, Thomas	. .	Stoneleigh, Coventry, Warwickshire
Chapman, Thomas	3, Arundel-st., Strd.	
Chapman, George	3, Arundel-st., Strd.	
Charge, Thomas	. .	Barton, Darlington, Durham
Charlton, J.	. .	
Chaundy, Richard	. .	Oxford
Chawner, Richard Croft	. .	Wall, Lichfield, Staffordshire
Cherry, George Henry	. .	Denford House, Burghfield, Reading
Chillingworth, William	. .	Cuddesden, Tetsworth, Oxon.
Chichester, J. P. Bruce, M.P.	24, Chester-st. Gr. pl	Arlington House, Barnstaple, Devon.
Chisman, John	. .	Stockton-upon-Tees, Durham
†Cholmeley, Sir Mont. J., Bart.	. .	Easton Hall, Coltersworth, Lincolnshire

Names.	Town Residence.	Country Residence.
Chrisp, Thomas		Hawk Hill, Alnwick, Northumberland
Christie, Langham		Preston Deanery, Hackleton, Northam.
†Chrystie, William	20, Chester-tr. R. pk	
Church, Robert		Bishopstoke, Westbury, Wiltshire
Chute, W. Wiggett		Pickenham Hall, Swaffham, Norfolk
Clark, Joseph		Maidenhead, Berkshire
Clarke, C. J.		Egham, Surrey
Clarke, Joseph, Jun.		Ashby, Sleaford, Lincolnshire
Clarke, K.	35, Southampt.-bls.	
Clarke, Rev. C.		Henstead, Beccles, Suffolk
Clarke, Rev. John		Chertsey, Surrey
Clarke, Thos. E.		Chard, Somersetshire
†Clay, William, M.P.		Fullwell Lodge, Twickenham, Middlsx.
Clayden, John		Littlebury, Saffron Walden, Essex
Clements, Viscount, M.P.	2, Grosvenor-sq.	Rynn, Mohill, Leitrim, Ireland
Clifton, Capt. T.		
Clinch, J. W.		Witney, Oxfordshire
Clode, William		Bakeham House, Egham, Surrey
Close, John		Great Linford, Newport Pagnell, Bucks.
Clutton, Robert		Hartswood, Reigate, Surrey
Clutton, John	8, Parliament-st.	
Cobb, Timothy Rhodes		Steeple-Aston, Deddington, Oxon.
Codrington, O. Calley		Wroughton, Swindon, Wiltshire
†Colebrooke, Sir Jas. E., Bart.		Colebrooke Park, Tonbridge, Kent
Coles, James		Stratton-Audley, Bicester, Oxon
Collett, Russell,		The Jungle, near Lincoln
Collingwood, J. V.		Abingdon, Berkshire
Collins, Rev. T. F.		Betterton, Wantage, Berkshire
Colville, Frederick		
Colvin, B. B.		Monkhams Hall, Waltham Abbey, Esx.
†Compton, Henry Combe, M.P.	16, CarltonHo.-ter.	Minstead Manor Ho., Lyndhurst, Hants
Compton, Richard		Eddington, Hungerford, Berks.
Connop, H., Jun.		
Cook, Rev. Joseph		Thedingworth, Market Harbro', Nthmpt.
Cook, John		Down-Ampney, Cirencester, Glouc.
Cook, T.		Howthorp, Northampton
Cook, Rev. T. L. B.		Oxford
Cooke, Layton	12, Pall Mall	
Cooke, Rev. T. L.		Beckley, near Oxford
Cooling, John		Lower Winchindon, Thame, Oxon.
Cooper, J. G.		Blythburgh, Southwold, Suffolk
Cooper, Samuel		Henley
Cooper, Thomas		Norton, Seaford, Sussex
Cooper, W. D.		Highgate
Copeland, Joseph		Abingdon, Berkshire
Copeland, William		Abingdon, Berkshire
Cormack, William	Covent Garden	
Cormack, William John	Covent Garden	
Cornish, Rev. J. J.		Kenwyn, Truro, Cornwall
Corrance, Frederick		Loudham Park, Woodbridge, Suffolk
Cother, William		Middle Aston, Woodstock, Oxon.
Cottam, George	Winsley-st., Oxf.-s.	
Cotterell, Sir J. Geers, Bart.,		Garnons, near Hereford
Cottingham, L. O.		Reydon, Southwold, Suffolk
Courtney, W.		Newton-Stacey, Whitchurch, Hants.
Coverdale, John	1, Field-ct. Gr's I.	Oak Lodge, Kilburn, Middlesex
Cowling, Charles		Rye Farm, Oxfordshire
Coyney, W. Hill		Weston Coyney, Lane End, Staffs.
Cozens, D. G.		Bickenhall, Taunton, Somerset.
Cradock, Sheldon		Hartforth Hall, Richmond, Yorkshire

Names.	Town Residence.	Country Residence.
Cragg, William	. .	Threckingham, Folkingham, Lincolns.
Cramp, John M.	. .	St. Peter's, Isle of Thanet, Kent
Cramp, John	. .	Garlinge, Margate, Kent
Cripps, Edward	. .	Cirencester, Gloucestershire
Cripps, Joseph, M.P.	. .	Cirencester, Gloucestershire
Cripps, Thomas	. .	Oxford
Cripps, Raymond	. .	Cirencester, Gloucestershire
Crisp, Thomas	. .	Gedgrave Hall, Orford, Suffolk.
Croft, Sir John, Bart., F.R.S.	45, Brook-street	Cowling Hall, Yorkshire
Crofton, Thomas	. .	Holywell, Durham
Crompton, John Bell	. .	Milford, near Derby
Croome, James	. .	Acton Hall, Berkeley, Gloucestershire
Cross, W. J.		
Crouch, A. W.	. .	Ridgmount, Woburn, Bedfordshire
Crowdy, Richard	. .	Faringdon, Berkshire
Cubley, Samuel	. .	Quarrington, Sleaford, Lincolnshire
†Cure, Capel	2, Devonshire-pl.	Blake Hall, Ongar, Essex
Currie, Henry	. .	West Horsley Pk., Leatherhead, Surrey
Currie, Edmund	. .	Oakley House, Abingdon, Berkshire
Curteis, Herbert B.	19, Bridge-st., Wstr	Peasemarsh, Rye, Sussex
Curtis, Adml. Sir Lucius, Bart.	. .	Gatcombe House, Portsmouth, Hants.
Dadds, John	. .	St. Nicholas, Thanet, Kent
Darlington, Earl of	40, Upp. Brook-st.	Snettisham Hall, Lynn, Norfolk
Dashwood, Francis	9, Seymore-place	Halcot, Bexley, Kent
Daubeny, Chas., M.D., F.R.S.	. .	Oxford University
Davey, William	. .	South Park, Headon, Hull
Davey, George	. .	Dorchester, near Benson, Oxfordshire
Davenport, George	. .	Oxford
David, Evan	. .	Radyr Court, Cardiff, Glamorganshire
Davies, Evan	. .	Paton, Wenlock, Salop
Davies, D. Saunders	United Univ. Club	Pentre, Newcastle, Emlyn
Davies, Rev. Thomas	. .	Jesus' College, Oxford
Davies, W. H.	Church-st., Chels.	
Davis, William	. .	Bicester, Oxfordshire
Davis, William H.	. .	
†Davis, Samuel	. .	Swerford Park, Banbury, Oxon.
†Davis, Richard	. .	Skeynes, Edenbridge, Seven Oaks, Kent
Davison, Thomas	. .	Durham
Dawson, Edward E.	. .	Ingthorpe, Stamford, Lincolnshire
Dawson, Edward	. .	Aldcliffe Hall, Lancaster
Day, Isaac	. .	Northleach, Gloucestershire
Deane, James	. .	The Yews, Tottenham
Deane, Ralph	. .	Escourt House, Reading, Berks.
Deare, Thomas	. .	Longworth, Great Faringdon, Berks.
Dearlove, John	. .	Brightwell, Wallingford, Berks.
Deedes, William	. .	Sandling, Hythe, Kent
†Denbigh, Earl of	. .	Newnham Paddock, Lutterworth, Leic.
Dennis, Robert	. .	Greetham, Horncastle, Lincolnshire
Dent, Joseph	. .	Ribsten Hall, Wetherby, Yorkshire
Denton, Thomas	. .	Lew, Oxfordshire
De Visme, Rev. James	. .	Bath
Devon, Earl of	4, Bryanstone-sq.	Powderham Castle, Exeter, Devon.
Dewe, Thomas	. .	
†Dewing, R.	. .	Carbrooke, Watton, Norfolk
Dilke, Captain, R.N.	. .	Maxstoke Castle, Coleshill, Warwicksh.
Dillon, Viscount	. .	Ditchley Hall, Oxfordshire
†Divett, Edward, M.P.	20, Chpl.-st, Grov-pl	Bystock, Exmouth, Devon.
Dixon, George	. .	Oxford

Names.	Town Residence.	Country Residence.
Dixon, E.	. .	Ashwood House, Dudley, Worcestersh.
Dixon, Charles	. .	Stanstead Park, Emsworth, Hants.
Dixon, R. W.	. .	Wickham Bishops, Witham, Essex
Dixon, Henry	. .	Witham, Essex
Dixon, Henry	. .	Oxford
Dodd, George	. .	Chenies, Rickmansworth, Herts.
Dodd, W. J., Jun.	. .	Chickenden, Oxfordshire
Dodds, Thomas	. .	Standish Hall, Wigan, Lancashire
Dolphin, J.	. .	Swafield, North Walsham, Norfolk
Dormer, C. C.	. .	Ronsham, Woodstock, Oxon.
Dormer, W.	. .	East Hanney, Abingdon, Berks.
Doughty, F. G.	. .	Martlesham, Woodbridge, Suffolk
Drake, C. B.		
Drake, T. T.	. .	Shardloes, Amersham, Bucks.
†Drax, J. S. W. S. Erle	. .	Charborough Park, Blandford, Dorset.
Drewitt, John	. .	Peppering, Arundel, Sussex
Driver, Edward	Richmond-tr, Wh.	Vassall Road, North Brixton, Surrey
Driver, George N.	Richmond-tr, Wh.	
Druce, Samuel	. .	Ensham, near Oxford
Druce, Joseph	. .	Ensham, near Oxford
†Drummond, Andrew Robert	2, Bryanstone-sq.	Cadland, Nw. For, Southampton, Hants
Drury, George	. .	Eastbourne, Sussex
Duckworth, John	. .	Barnet, Herts.
Duff, A.	. .	Woodcot House, Oxfordshire
Duffield, Christopher	. .	Grantham, Lincolnshire
Duke, W. E.	. .	East Lavant, Chichester, Sussex
Duke, Henry	. .	Earnley, Chichester, Sussex
Dundas, Hon. Thomas		
Dunn, Thomas	. .	Kentbury, Newbury, Bucks.
Dunning, Ralph	. .	Bishop's Burton, Beverley, Yorkshire
Dyer, George	. .	East Tisted, Alton, Hants.
Dyke, Rev. H. S.	. .	Plynt, Cornwall
Dymoke, Hon. Champion	10, Whitehall-pl.	Scrivelsby Court, Horncastle, Lincolnsh.
Eames, John	. .	Ashby-de-la-Zouch, Leicestershire
Enley, William	. .	Oxford
Edgington, Benjamin	Duke-st. Southwrk.	
Edmonds, Albert	. .	Inglesh, Lechlade, Gloucestershire
Edmonds, William	. .	Kilmscott, Lechlade, Gloucestershire
Edwardes, Hon. William	. .	Edmundthorpe, Melton Mowbray, Leic.
Edwardes, Hon. Geo.	. .	Noyadd Llanarth, Aberyron
Edwards, John	. .	Oxford
Edwards, Frederick	1, Stafford-pl. Pim.	Barnham, Thetford, Norfolk
Edwards, E.	. .	
Edwards, Henry	. .	Sutton, Woodbridge, Suffolk
Edwin, John	. .	Sheriff's Linch, Worcestershire
†Elliott, John	. .	Chapel Brampton, near Northampton
Ellison, William	. .	Syzergh Castle, Kendal, Westmoreland
Ellman, Rev. H. J.	. .	
Ellman, John	. .	Glynde, Lewes, Sussex
Ellman, Thomas	. .	Beddingham, Lewes, Sussex
Ellman, R. H.	. .	Glynde, Lewes, Sussex
Elton, George	. .	Redland, near Bristol
Elwood, Lieut. Col. C. W.	. .	Clayton Priory, Brighton, Sussex
Ensworth, Thomas	. .	Oxford
Enys, John Samuel	. .	Enys, near Penryn, Cornwall
Erle, Rev. Christopher	. .	Hardwicke, Aylesbury, Bucks.
Erle, W. H. B.	. .	Baldon, near Oxford
Etwall, William	. .	Manor House, Thruxton, Andover, Han.
Evans, Rev. W.	. .	Pusey, Faringdon, Berkshire

Names.	Town Residence.	Country Residence.
Evans, W.	. .	Hackney, Middlesex
Evans, Richard	. .	Evans Griff, Nuneaton, Warwickshire
Eve, Richard	. .	Silsoe, near Bedford
Everitt, Isaac	6, Torrington-sq.	South Creak, Fakenham, Norfolk
Ewen, Thos. L'Estrange	. .	Dedham, Essex
Eyston, Charles	. .	Hendred, Wantage, Berkshire
Fairthorne, Henry	. .	Brightwell, Wallingford, Berks.
Faithfull, Rev. G.	. .	Lower Heyford, Bicester, Oxon.
Fane, J.	. .	Wormsley, Stoken-Church, Oxon.
Fardell, John	. .	Lincoln
Farmer, Edward	. .	Fazeley, Tamworth, Staffordshire
Farrer, Rev. Richard	. .	Ashley, Rockingham, Northampt.
Farrow, W.	. .	Market Rasen, Lincolnshire
Faulkner, Wm.	. .	Burford, Oxfordshire
Faulkner, John	. .	North-Hinksey, near Oxford
Faulkner, Thomas	. .	Queenford, Dorchester, Dorset.
Faux, Joseph	. .	Cold-Ashby, near Northampton
Fearon, —, Sen.	. .	
Feilden, William, M.P.	14, Hanover-st.	Feniscowles, Blackburn, Lancashire
Ferard, Joseph	8 Figtree-ct Temple	
Fernie, William	. .	Woodchester, Stroud, Gloucestershire
Field, William	. .	Ulceby, Barton, Lincolnshire
Fielden, Joseph	. .	Whillen, Blackburn, Lancashire
Fiennes, Hon. Wm. Twisleton	1, D, Albany	Broughton Castle, Banbury, Oxfordsh.
Filliter, George	. .	
Finch, Richard	. .	Headington, near Oxford
Finlayson, Dr.	. .	Cheltenham, Gloucestershire
Fisher, John	. .	East Hanney, Abingdon, Berks.
Fisher, Rev. R. W.	. .	Hill Top, Kendal, Westmoreland
Fisher, Thomas Richard	. .	Oxford
Fisher, William	. .	Copyhold, Newbury, Berkshire
Fletcher, Sir Henry, Bart.	. .	Ashley Park, Walton-on-Thames, Surr.
Flesher, Rev. J. T.	. .	Tiffield, Towcester, Northampton.
Flight, Thomas	. .	Islington
Floyd, Thomas	. .	Frilford, Abingdon, Berks.
Floyer, J. G.	. .	Ketsbyn, Louth, Lincolnshire
†Floyer, John	. .	Stafford, Dorchester, Dorset.
Foll, William	. .	Chalgrave, Dunstable, Beds.
Footner, W. A.	. .	Romsey, Hampshire
Fordham, John George	. .	Odsey House, near Royston, Herts.
Foreman, Thomas	. .	Acton-Burnell, Much-Wenlock, Salop.
Foreshew, William	. .	Meysey-Hampton, Fairford, Gloucester
Forster, John	18 Carey st, Ln-inn	Newton-le-Willows, Bedale, Yorks.
Fort, George	. .	Adderbury House, Salisbury, Wilts.
Foster, J. W.	. .	Clapham, near Settle, Yorkshire
Fowlis, Rev. Henry	. .	Little Brickhill, Fenny-Stratford, Bucks.
Fowke, William	. .	Rudgeley, Staffordshire
Fowler, Henry	. .	Kingham, Chipping-Norton, Oxon.
Fowler, William M.	. .	Sunning Hill, Windsor, Berkshire
Fowlie, Wm.	. .	Red House, Hursley, Winchester, Hants
Fox, Rev. Dr.	. .	Queen's College, Oxford
Ffrance, T. R. Wilson	. .	Rawcliffe Hall, near Preston, Lancashire
†Franklin, Richard	. .	Clementstone, Bridgend, Glamorganshi.
Franklin, Edward L.	. .	Ascott, near Benson, Wallingford, Oxon.
Franklin, John	. .	Ewelm, near Benson, Wallingford, Oxon.
Frazer, Alexander	. .	Claydon, Winslow, Bucks.
Freeman, Thomas	. .	Henham, Wangford, Suffolk
Freere, Rev. E.	. .	Finningham, Eye, Suffolk
Fremantle, Sir Wm., G.C.H.	. .	Englefield Green, Chertsey, Surrey

Names.	Town Residence.	Country Residence.
Frost, W. F.	. .	Thorrington, Colchester, Essex
Fryer, William	. .	Lytchet, Wareham, Dorset.
Fuge, Robert	. .	Dawlish, East Teignmouth, Devon.
Fullard, Thomas	. .	Thorney, Peterborough, Northamptons.
Fullerton, Colonel John	. .	Thrybergh Hall, near Rotherham, York.
Fuller, Hugh	. .	Portslade, Brighton, Sussex
Fulljames, Thomas	. .	Hasfield Court, near Gloucester
Fulljames, Thomas, jun.	. .	Hasfield Court, near Gloucester
Fullshaw, Richard	. .	Knighton, near Leicester
Gabb, Maker	. .	Abergavenny, Monmouthshire
Gage, Hon. W.	. .	Westbury House, Bp's Waltham, Hants.
Gardner, Rev. Christopher	. .	East Dean, Midhurst, Sussex
Gardner, James	. .	Adderbury, Banbury, Oxfordshire
Gardner, James	. .	Banbury, Oxfordshire
Garne, William	. .	Aldsworth, Northleach, Gloucestershire
Garret, Drake	. .	Lamman Park, Aylesbury, Bucks.
Garrett, Richard, jun.	. .	Leiston, Saxmundham, Suffolk
Gater, Caleb H.	. .	Swathling, Hampshire
Gater, Edward	. .	Townhill, Hampshire
Gater, W. B.	. .	West End, Hampshire
Gedney, John	. .	Reden Hall, Harleston, Norfolk
Gee, Thomas	. .	Barton, Lincolnshire
Gibbon, Alexander	. .	Staunton, Gloucestershire
Gibbs, Thomas	. .	Ampthill, Bedfordshire
Gibbs, William	. .	Alveston Hill, Stratford-on-Avon, War.
Gibbs, George	26, Down-st., Pic.	
Gibbs, William	. .	Itchenor, Chichester, Sussex
Gibbs, Joseph	. .	Elsfield, near Oxford
Giblett, John	8, West Smithfield	
Gibson George	. .	Sandgate, Storrington, Sussex
Giddy, C., Com. R.N.	. .	Penzance, Cornwall
Gilbertson, Matthias	. .	Elm Cottage, Egham, Surrey
Gilbert, William	. .	Hippenscombe, Wiltshire
Gilbert, Rev. A. T.	. .	Oxford University
Gillett, Joseph Ashby	. .	Banbury, Oxfordshire
Gillett, W.	. .	South Leigh, Witney, Oxfordshire
Gillett, Joseph	. .	Little Haseley, Tetsworth, Oxfordshire
Gilliat, Aitkin	. .	Scrofield, Horncastle, Lincolnshire
Gills, W.	. .	Alveston Heath, Stratford-on-Avon, War.
Gladwin, Thomas	. .	Marden Park, Godstone, Surrey
Glaister, Henry R.	. .	Bedale, Yorkshire
Glaister, Rev. William	. .	University College, Oxford
Goddard, Horatio N.	. .	Cliff, Wootton Bassett, Wiltshire
Goddard, Edward	. .	Crookham, Newbury, Berkshire
Goddard, Philip		
Goddard, Rev. Richard	. .	Broadstone, Church Euston, Oxon.
†Godfrey, Edward	. .	OldHall, East-Bergholt, Hadleigh, Suffk
Godfrey, George	. .	Childrey, Wantage, Berkshire
Godfrey, Thomas	. .	Chawley, near Oxford
Godwin, John	. .	Durweston, Blandford Forum, Dorset.
Godwin, Richard		
Gonne, Thomas George	. .	Great Vaynor, Narbeth, Pembrokeshire
Good, George	. .	Gussage, Cranborne, Dorset.
†Goodden, John	. .	Compton House, Sherborne, Dorset.
Goodenough, Joseph	. .	Nether-Cerne, Dorchester, Dorset.
Goodlake, T. Mills	. .	Wadley House, Faringdon, Berks.
Goodlake, Thomas	. .	Benhams, Wantage, Berks.
Goodricke, Sir Francis L.H., Bt.	. .	Studley Castle, Alcester, Warwickshire

Names.	Town Residence.	Country Residence.
Gore, Ormsby, M.P.	66, Portland-place	
†Goring, Harry Dent, M.P.	Windham Club	Yapton Place, Arundel, Sussex.
Goring, Mrs.		Wiston Park, Steyning, Sussex
Goring, Charles		Wiston Park, Steyning, Sussex
Gorringe, J. P.		Eastbourne, Sussex
Gorringe, Mrs. J. P.		Eastbourne, Sussex
Gosford, William		Everingham, Pocklington, Yorkshire
Gough, Frederick		St. Alban's, Hertfordshire
Gower, G.		Dilham, North Walsham, Norfolk
†Gower, W. Leveson, Jun.		Titsey Place, Godstone, Surrey
Gowing, Edward		Eye, Suffolk
Graburn, R. S.		Branswell Cottage, Sleaford, Lincolns.
Graburn, William		Barton-on-Humber, Lincolnshire
†Gratwick, W. T.		Ham, Arundel, Sussex
Grace, James		Wordrobes, Risborough, Bucks.
Grace, Rev. H. T.		Jevington, Eastbourne, Sussex
Graham, Captain, R.N.		Netherby Hall, Longtown, Cumberland
Graham, Rev. H. G.		
Grain, P.		Chilford, Cambridgeshire
Grant, J. C.		Stamford, Lincolnshire
Grantham, Stephen		Stoneham, Lewes, Sussex
Graves, Robert		Bloxholm, Sleaford, Lincolnshire
Greaves, Edward		Barford, near Warwick
Green, Richard		Great Gonnerby, Grantham, Lincolns.
Green, —		
Green, Rev. G. W.		Court-Henry, Llandeilo, Narbeth, Pem.
Greene, W. Burnaby		Wickham, Bishop's Waltham, Hants.
Greenaway, Charles, M.P.		Barrington Grove, Burford, Oxfordshire
Greenwood, Charles		Wallingford, Berkshire
†Gregg, Thomas		
Gregory, William		Cirencester, Gloucestershire
Gregory, Arthur F.		Styvichal Hall, Coventry, Warwicks.
Gregory, Thomas		Cutslow, Oxfordshire
Gresley, Rev. W.		St. Charles, Lichfield, Staffordshire
Grey, Sir Chas. Edw., Bt., M.P.		The Oaks, Carshalton, Surrey
Grey, W. H. C.	10, Cmb.-pl., N. Rd.	Clifton, near Bristol, Gloucestershire
Griffin, John		Hemel-Hemstead, Hertfordshire
Griffith, C. Darby		Padworth House, Reading, Berkshire
Griffith, Mrs. Darby		Padworth House, Reading, Berkshire
Griffith, Samuel Y.		Oxford
Grimshaw, W.		Hackney, Middlesex
Grove, L.		Shenstone Park, Lichfield, Staffords.
†Grove, Thomas		Fern, Shaftesbury, Dorsetshire
Guerrier, William	8, West Smithfield	
Guillemard, John L., F.R.S.	27, Gower-street	Clavering, Stansted-Montfitchet, Essex
Gunner, William		Well Hall, Eltham, Kent
Gurdon, Rev. Thomas		Cranworth, Shipdam, E. Dereham, Nflk.
Guy, George		Turl, Oxfordshire
Gwilt, Rev. Daniel		Icklingham Rectory, Mildenhall, Suff'k.
Hack, James		Bowley, Chichester, Sussex
Haines, Edward		Stratton, Cirencester, Gloucestershire
Halcomb, William		Poulton, Marlborough, Wiltshire
Halcomb, W. H.		Hungerford, Berkshire
Hale, Thomas		East Hanney, Abingdon, Berks.
Halke, Rev. J		Weston-by-Welland, Northamptonshire
Halton, John		
Hall, John		Bretforton, Evesham, Worcestershire
†Hall, John		Wiseton, near Bawtry, Nottinghamsh.

Names.	Town Residence.	Country Residence.
Hall, George Webb	. .	Sneed Park, Bristol
Hall, Henry	. .	Holbrook, Wincanton, Somersetshire
Hall, Richard	. .	Cirencester, Gloucestershire
Halstead, Thomas	. .	Woodcot, Nantwich, Cheshire
†Hamilton, Captain Archibald	. .	Rozelle, nr. Newton-upon-Ayr, Ayrshire
Hammans, C.	. .	Garford, Abingdon, Berkshire
Hammersley, Hugh	69, Pall Mall	Great Haseley, Tetsworth, Oxfordshire
Hamond, Wm. P.	123, Mount street	
Hanbury, John	. .	Carborough, Lichfield, Staffordshire
Hanbury, Osgood	. .	Coggeshall, Essex
Hancock, Abraham	. .	Hall Place, Rockley, Warnford, Hants
Handley, Major	. .	Pointon, Folkingham, Lincolnshire
Hanmer, Lieutenant-Colonel	. .	Bear Place, Maidenhead, Berks.
Hannam, George	. .	Alland Grange, Isle of Thanet, Kent
Hannam, Henry S.	. .	Burcott, Bensington, Oxfordshire
Hannen, Henry, Jun.		
Harcourt, Capt. Octavius, R.N.	. .	Swinton Park, Bedale, Yorkshire
Harcourt, W. B.	. .	St. Leonard's, Windsor, Berks.
Harding, Joseph	. .	Maiden-Bradley, Mere, Wiltshire
Hare, Joseph	. .	Wilton Farm, Beaconsfield, Bucks
†Hare, T.	. .	Springfield, Bristol
Harford, W.	. .	Barly Wood, Bristol
Harland, Wm. Chas., M. P.	3, Chesterfield-st.	Sutton Hall, Easingwold, Yorkshire
Harris, William	. .	Weston, Leamington, Warwickshire
Harris, Richard	. .	Wootton Grange, Northamptonshire
Harris, John	. .	Hinton, Wantage, Berkshire
Harris, Robert	. .	Hinton, Abingdon, Berkshire
†Harrison, Richard	. .	Wolverton, Stony-Stratford, Bucks.
Harrison, Daniel	. .	Kendal, Westmoreland
Harrison, Rev. J.	. .	Dinton, Aylesbury, Buckinghamshire
Harrold, O. W.	. .	Donnington Court, Ledbury, Herefords
Hart, H. P.	. .	Beddingham, Sussex
Harvey, Robert B.	. .	Harleston, Norfolk
Harvey, Robert H.	. .	Sturminster, Newton, Dorsetshire
Harwood, Thomas	. .	Winterfold, Kidderminster, Worcestersh
Hartley, Rev, W. H. H.	. .	Bucklebury House, Woolhampton, Brks.
Haselfort, R. L.	. .	Boreham, Chelmsford, Essex
Hastings, John	. .	Longham, East Dereham, Norfolk
Hastings, Matthew	. .	Ensham, Witney, Oxfordshire
Hawkesley, Rev. J. W.	. .	Redruth, Cornwall
Hawkins, William	. .	Hitchin, Hertfordshire
†Hawkins, Thomas	. .	Assington, Neyland, Suffolk
Hawkins, William	. .	Colchester, Essex
Hawkins, J. H.	. .	Dorchester, Dorset.
Hawkins, John	. .	Hitchin, Hertfordshire
Hawtrey, John.	. .	
Haynes, William	. .	Handborough, Woodstock, Oxfordshire
Hayward, William	. .	Hintlesham
Hayward, Drinkwater S.	. .	Frocester Court, Stroud, Gloucestershire
Hayward, J. Curtis	. .	Quedgeley, near Gloucester
Hayward, Henry	. .	Wattington, near Oxford
Hayward, William	. .	Manor House, Weston Turville, Bucks
Heald, Dr.	. .	Spalding, Lincolnshire
Heath, Sergeant	. .	Anstey Priory, Dorking, Surrey
Heighton, Edward	. .	
Heiver, John.	. .	
Henning, James	. .	Wolverton, Dorchester, Dorset.
Hercy, John	. .	Hawthorn Hill, Bracknell, Berks.
Herrick, William	. .	Bear Manor Park, Loughboro', Leicest.
Herver, Joseph.		

Names.	Town Residence.	Country Residence.
Hervey, Lionel	. .	Winkfield, Bracknell, Berkshire
Hester, George P.	. .	Oxford
Hewer, Jasper	. .	Minchinhampton. Gloucestershire
Hewer, William	. .	Northleach, Gloucestershire
Hewer, John	. .	Hampton Lodge, near Hereford
Hewer, Joseph	. .	Eastington, Northleach, Gloucest.
Hewitt, Lieut. R.N.	. .	Eastbourne, Sussex
Heygate, Robert	. .	West Haddon, Daventry, Northampton
†Heywood, Sir Benjamin, Bt.	. .	Acresfield, Pendleton, Manchester
Hicks, Leonard	5, Gray's-Inn-sq.	
Hicks, Benjamin	. .	Hanley, Newcastle-under-Lyne, Staff.
Hickson, Richard	. .	Hougham, Grantham, Lincolnshire
Higgins, W. B.	. .	Picts' Hill, Bedfordshire
Hill, Rev. C.	. .	Buxhall, Stowmarket, Suffolk
Hill, Charles	. .	Wellingborough, Northamptonshire
Hillyard, Clark	. .	Thorpelands, near Northampton
Hincks, T. C	. .	Breckonborough, Thirsk, Yorkshire
Hinton, William	. .	Daglingworth, Cirencester, Gloucesters.
Hinxman, Edward, Jun.	. .	Little Dunford, Salisbury, Wilts.
Hitchcock, Henry	. .	Boddicot House, Banbury, Oxfordshire
Hitchman, S.	. .	Chipping-Norton, Oxfordshire
Hitchings, George	. .	Oxford
Hoare, Captain	. .	Wavendon, Fenny-Stratford, Bucks.
Hoare, Hugh Richard	100, Eaton-sq.	Lillingstone, Towcester, Northamp.
Hobbs, Henry	. .	Bocking, Braintree, Essex
Hobbs, William	. .	Bocking, Braintree, Essex
Hobbs, William Fisher	. .	Mark's Hall, Coggeshall, Essex
Hobgen, Charles	. .	Sidlesham, Chichester, Sussex
Hobgen, Joseph	. .	Sidlesham, Chichester, Sussex
Hoblyn, William Paget	. .	Marlhouse, Elmstead, Bromley, Kent
Hodgkinson, Richard	. .	Morton Grange, Dorchester, Dorset.
Hodson, W.	. .	Ilford, Essex
Hodson —	. .	Falmer Court Farm, Lewes, Sussex
Holbeach, William	. .	Farnborough, Kineton, Warwickshire
Holcombe, Rev. G. F.	. .	Brinkley, Newmarket, Cambr.
†Hollist, Hasler	. .	Lodsworth, Midhurst, Sussex
Holmes, William Sandcroft	. .	Redenhall, Harleston, Norfolk
Holton, Rev. L. M.	. .	Woolhampton, Newbury, Berkshire
Hony, Rev. P. F.	Athenæum Club	
Honywood, Rev. P. J.	. .	Mark's Hall, Coggeshall, Essex
Hooton, John Head	. .	Kempston, near Bedford
Hopcraft, Alfred	. .	Halse, Brackley, Northampton.
Hopkins, John	. .	Tidmarsh House, Reading, Berks.
Hopper, Richard	. .	Papplewick, near Nottingham
Horlock, J. W.	. .	The Rooks, Marshfield, Glouces.
Hornsby, Richard	. .	Grantham, Lincolnshire
Horwood, John	. .	Steam Park, Brackley, Northampt.
Hoskins, Kedgwin, M.P.	90, Sloane street	Birch House, Ross, Herefordshire
Hoskins, Sir Hungerford, Bt	. .	Harewood, Ross, Herefordshire
Hoskyns, Chandos Wren	10, Chester-sq.	Wroxhall Abbey, Warwickshire
Houghton, John	. .	Broom Hill, Sunninghill, Windsor, Bks.
Houldsworth, Thomas, M.P.	16, Suffolk-street	Portland Place, Manchester
House, John	. .	Anderson, Blandford Forum, Dorset.
House, John, jun.	. .	Quailston
Howard, T. A.	. .	Yattenden, Berks.
Howard, Joseph	. .	Aylesbury, Bucks.
Howard, —	. .	Aylesbury, Bucks.
Howard, Charles	. .	14, Monkgate, York
Howard, George	. .	
Howard, H.	. .	Greystock, Penrith, Cumberland

Names.	Town Residence.	Country Residence.
Howard, Hon. Henry . .	. .	Charlton, Malmesbury, Wilts.
Huckvale, Thomas . . .	. .	Over-Norton, Chipping-Norton, Oxon.
Hudson, John	. .	Castleacre, Swaffham, Norfolk
Hull, Richard	. .	Sutton-Benger, Chippenham, Wilts.
Humfrey, J.	. .	Upton, Abingdon, Berks.
Humfrey, John	. .	Upton, Abingdon, Berks.
Humfrey, William . . .	. .	Boxford, Newbury, Berks.
Hunt, James	. .	Oxford
Hunt, Zachary D.	. .	Aylesbury, Bucks.
Husband, T., jun.	. .	Stoke, Devonport, Devon.
Hutley, William	. .	Witham, Essex
Hutt, John	. .	Water Eaton, near Oxford.
Hutt, William	. .	Thrupp, Woodstock, Oxon.
Hutton, John	. .	Sowber Hill, Northallerton, Yorkshire
Hutton, William	. .	Gate Barton, Gainsbro', Lincolnshire
Ide, John	. .	West Wittering, Chichester, Sussex
Ifill, Dr.	9, Welbeck-street	
Ilott, James A.	. .	Bryanston, Blandford Forum, Dorset.
Inge, Captain	. .	
Ingram, ——	. .	Steyning, Sussex
Ingram, Rev. James, D.D. .	. .	Trinity College, Oxford
Inskip, Thomas	. .	Marston, Ampthill, Bedfordshire
Isaacson, John	. .	Clare, Suffolk
Irving John, M.P. . . .	1, Richmond-terr.	Ashford, Staines, Middlesex
Jackman, James	. .	Crendon, Thame, Oxfordshire
Jackson, Hugh	. .	Wisbeach, Isle of Ely, Cambridgeshire
Jaques, R. M.	. .	St. Trinian's, Richmond, Yorkshire
Jarratt, William	. .	Lletai, Glamorganshire
†Jarrett, John	. .	Camerton House, Bath, Somerset.
Jeffrys, R.	. .	Structshill, Bridgewater, Somerset.
Jellicoe, John	. .	Brighterton, near Stafford
Jemmett, Henry	. .	Burford, Oxfordshire
Jenkins, John	. .	St. Ynyn, Cardiff, Glamorganshire
Jenner, Henry	. .	Chisenbury, Pewsey, Wiltshire
Jennings, R. F.	. .	Belsham Green, Sandwich, Kent
Jersey, Earl of, ...	38, Berkeley-squa.	Middleton Park, Bicester, Oxfordshire
Jervis, Sir Raymond . . .	. .	Fair Oak Park, Winchester, Hants.
Jobson, William	. .	Newtown, Wooler, Northumberland
Jodrell, Sir Rd. Paul, Bart. .	64, Portland-place	Sall Park, Reepham, Norfolk
Johnston, Sir F., Bart. . .	. .	Melton Mowbray, Leicestershire
Johnstone, John Hutton . .	. .	Menston, near Ledbury, Herefordshire
Johnson, Rev. A.	. .	Hampton House, Devon.
Johnson, Rev. Dr.	. .	Parran, Cornwall
Johnson, Cuthbert William .	14, Gray's-inn-sqre	Wallingtons, Newbury, Berks.
Johnson, George	53, Tavistock-squ	
Jonas, Samuel	. .	Ickleton, Linton, Cambridgeshire
Jones, Philip, Jun. . . .	. .	Sugwas Court, near Hereford
Jones, John	. .	Harrington, Spilsby, Lincolnshire
Jones, Whitmore	. .	Chassleton, Chipping Norton, Oxon.
Jones, William	. .	Sheep House, near Gloucester
Jordan, Rev. G. W. . . .	. .	Waterstock, Thame, Oxfordshire
Jowett, Rev. J. F. . . .	. .	Kingston, Bagpuze, Abingdon, Berks.
Juckes, Thomas	. .	Fearn, Salop.
Kedward, James D. . . .	. .	
Kemble, H.	. .	Leggatt's, near Hatfield, Hertfordshire

Names.	Town Residence.	Country Residence.
Kemble, Thomas	. .	Leggatt's, near Hatfield, Hertfordshire
Kendle, C. J.	. .	Fordham, Downham Market, Norfolk
Kendle, James	. .	Weasenham, Fakenham, Norfolk
Kensey, George	. .	Cornbury Park Farm, Witney, Oxon.
Kersey, James	. .	Talton, Cirencester, Gloucestershire
Kilby, George	. .	Queenborough, Kent
Kilson, Rev. H.	. .	Folkington, Hailsham, Sussex
Kimberley, George	. .	Trotsworth, Egham, Surrey
Kimber, Thomas	. .	Tyfield Wick, Abingdon, Berks.
Kimber, Thomas	. .	Bourton-on-the-Water, Stow, Glo'ster
Kimber, Thomas	. .	North Cerney, Cirencester, Gloucester
†Kinder, John	. .	Sandridge Bury, St. Albans, Herts.
Kinder, Thomas	. .	Sandridge Bury, St. Albans, Herts.
King, W. F.	. .	Stourton, Mere, Wiltshire
King, Rev. James	. .	Henley-on-Thames, Oxfordshire
King, J. Bennett	. .	Wotton, Abingdon, Berkshire
King, Bolton	. .	Umberslade, Warwickshire
†King, Charles	. .	Little Brinton, Northamptonshire
King, Fielden	. .	Berniton, Petersfield, Hants.
King, F.	. .	Oxford
King, Robert	. .	Wytham, near Oxford
†Kingsmill, William	. .	Sidmanton Park, Whitchurch, Hants.
Kinsman, Rev. R. B.	. .	
Kintore, Earl of	. .	Keith Hall, Aberdeen
Kirby, John	. .	South Moreton, Wallingford, Berks.
Knatchbull, William	. .	Babington, Frome, Somersetshire
†Knight, Henry Gally, M.P. .	69, Grosvenor-st.	Firbeck Hall, Bawtry, Yorkshire
Knight, Edward	. .	Godmersham Park, Canterbury, Kent
Knight, E. Jun.	. .	Troughton House, Alton, Hants.
†Kingscote, Thomas	. .	Kingscote, Tetbury, Gloucestershire
Knapp, H.		
La Coste, Thomas B.	. .	Abbey Mills, Chertsey, Surrey
Lakin, Henry	. .	Severn End, Upton, Worcestershire
Lance, E. J.	74, Albany-street	Barrossa Cottage, Bagshot, Surrey
Langdale, Hon. Charles, M.P.	31, Jermyn-street	Houghton Hall, Market-Weighton, York
Langford, T. C.	. .	Udinore, Rye, Sussex
Large, William	. .	Upper Lambourn, Berkshire
Large, Charles	. .	Broadwell, Burford, Oxfordshire
Latham, R. Cousins	. .	Clifton, Deddington, Oxfordshire
†Law, Rev. R. N.	. .	Christian-Malford, Chippenham, Wilts.
Lawford, Edward	. .	Leighton-Buzzard, Bedfordshire
Lawford, W. R.	. .	Leighton-Buzzard, Bedfordshire
Lawrence, R.	. .	Betterton, Berkshire
Lawrence, James	. .	Astree, Berkshire
Lawson, Andrew	. .	Aldborough Lodge, Boroughbridge, York
Lawson, W. C.	. .	Edinburgh
Leach, George	. .	Stoke, Devonport, Devonshire
Le Couteur, Colonel	. .	Belle-Vue, Jersey
Lediard, Thomas	. .	Cirencester, Gloucestershire
Lees, Charles	. .	Eastling, Faversham, Kent
†Lee, Lee J.	. .	Delington House, Ilminster, Somerset.
Lefevre, John G. Shaw, F.R.S.	5, Hyde Park-gard.	
Lefroy C. E.	. .	Enshot House, Farnham, Surrey
Lemon, Sir C., Bt. MP., F.R.S.	. .	Carclew, Penryn, Cornwall
Lescher, Joseph	. .	Boyles, Brentwood, Essex
Lethbridge, Sir Thos. B., Bart.	6, Upp Blgrave-st.	Sandhill Park, Taunton, Somerset.
Lewis, John	. .	Llanthetty Hall, near Brecknock

Names.	Town Residence.	Country Residence.
Lewis, Edward	. .	Bayford Bury, near Hertford
Lewis, Robert	. .	Stompain
Ley, Jacob	. .	Christ Church, Oxford
Ley, Rev. Jacob	. .	Oxford
Liefchild, W. G.	. .	Enfield, Middlesex
Lilford, Lord	10, Grosvenor-pl.	Lilford Hall, Oundle, Northamptonshire
Lincoln, Earl of	25, Park-lane .	Ranby Hall, Retford, Nottinghamshire
Lindsell, R.	. .	Biggleswade, Bedfordshire
Lines, W.	. .	Haddenham, Thame, Oxfordshire
Linnell, Richard		
Linton, Rev. J.	. .	Hemingford, St. Ives, Huntingdonshire
Lismore, Viscount	11, Up. Belgrave-st.	Shanbally Castle, Clogheen, Ireland
Little, William Hunter	. .	Lanvair Grange, Abergavenny, Monm.
Littlewood, John	. .	Armthorpe, Doncaster, Yorkshire
Livesay, Thomas	. .	Hackney, Middlesex
Lloyd, Rev. Thomas J.	. .	North Wraxall, Chippenham, Wilts
Lloyd, Cynnic	. .	Pontryfyth, Denbigh, North Wales
Lloyd, L. F. Lloyd	. .	Pontryfyth, Denbigh, North Wales
Lloyd, Llewellyn	. .	Pontryfyth, Denbigh, North Wales
Lloyd, W.	. .	Aston, Oswestry, Salop.
Lloyd, Rev. T.	. .	Swayfield, North Walsham, Norfolk
Lock, George	. .	Oxford
Lock, George	. .	Blandford, Dorsetshire
Loft, William	. .	Trusthorpe, Alford, Lincolnshire
Long, Walter, M.P.	29, Mill-street .	Preshaw House, Alton, Hampshire
Long, Walter J.	. .	Preshaw House, Alton, Hampshire
Longstaff, Charles	. .	
Lord, C.	. .	Bridge Norton, Witney, Oxon.
Lord, Richard	. .	Hambleden, Henley-on-Thames, Oxon.
Lousley, Job	. .	Hampstead-Norris, East Ilsley, Berks.
Lovesey, C. W.	. .	Charlton Kings, Cheltenham, Glouc.
Lowe, Charles	. .	Stamford, Lincolnshire
Lowndes, William	. .	Brightwell, Tetsworth, Oxon.
Lucan, Earl of	Spntine-ter, Knisbg	Laleham, Staines, Middlesex
Lucas, Joseph	. .	Rowsham, Aylesbury, Bucks.
Lugor, Elwood	. .	Hengrave, Bury St. Edmund's, Suffolk
Lumbert, R. C.	. .	Burghleigh Hill, Reading, Berks.
Lush, Joseph	. .	Kilmington, Bruton, Somersetshire
Lyne, William	. .	Kingham, Chipping-Norton, Oxon.
†Lyon, James Wittit	39, Belgrave-sq. .	
Mabbott, W. C.	. .	Lewes, Sussex
Macbride, Richard	. .	Oxford
Macdonald, Alexander	3, St. Mildred's-ct.	
†Mackenzie, Sir Francis A., Bt.	60, Lombard-street	Gairlock, Poolew, Ross-shire, N. B.
Maclaine, Colonel	. .	
Macnamara, A.	. .	Langoed Castle, Brecknock
Maitland, F. C.	Mincing-lane	
†Mainwaring, Townsend	. .	Great Markwell Hall, Wrexham, Denb.
Malins, Daniel	. .	Brackley, Northamptonshire
Mallam, Thomas	. .	Oxford
Maltby, E. H.	Temple	
Manby, Capt. Geo. W., F.R.S.	. .	Yarmouth, Norfolk
Manning, John	. .	Harpole, near Northampton
†March, Earl of	51, Portland-pl.	Goodwood Park, Chichester, Sussex
Marden, William	. .	Rainham, Norfolk
Margetts, William	. .	Woodstock, Oxfordshire
Marmont, James	. .	Bristol

Names.	Town Residence.	Country Residence.
Marshall, Captain Henry . .	4, Upp. Eaton-st.	
Marshall, William, M.P. . .	41, Upp. Grov.-st.	Patterdale Hall, Carlisle, Cumberland
Marshall, William	. .	Hurst, Chichester, Sussex
Marsham, R.	. .	Merton College, Oxford
Marsham, Robert	. .	Stratton Strawless Hall, Aylesham, Nfk.
Martin, Edward Wenman . .	61, Up. Seymour-st	Brickwood House, Croydon, Surrey
Martin, Henry Burgess . .	33, Eaton-place	Colston Hall, Bingham, Nottinghams.
Martin, Robert	. .	Asterby, Horncastle, Lincolnshire
†Mason, C. A.	. .	Farrinton, Ledbury, Hereford
Massingberd, Rev. Algernon .	. .	Gunby Park, Spilsby, Lincolnshire
Massop, John	. .	
Masters, Joseph	. .	Witney, Oxfordshire
Masters, Robert.		
Maton, James	. .	Collingbourne, Pewsey, Wilts.
Matson, Charles	. .	Baddow Park, Chelmsford, Essex
Matson, Robert	. .	Wingham, Kent
Matthew, John	. .	
Matthews, Peter	. .	Elkstone, Cirencester, Gloucestershire
Matthews, John	. .	Oxford
Matthews, Stephen . . .	. .	Lidiard, Swindon, Wiltshire
Mauleverer, William . . .	. .	Arncliffe Hall, Settle, Yorkshire
Maw, George	. .	Walkhouse Barrow
Maxwell, W.	. .	Everingham, Pocklington, Yorkshire
May, Charles	. .	Ipswich, Suffolk
Maydwell, Daniel	. .	Leatherhead, Surrey
Mayne, John Thomas, F.R.S.	Temple . . .	Teffont House, Salisbury, Wilts.
Menteath, Sir Chas. G. S., Bt.	. .	Closeburn Hall, Dumfries, N. B.
†Metcalf, C. J., Jun. . . .	. .	Roxton House, St. Neot's, Huntingdons.
Milden, T.	. .	Brinnington Hill, Warwick
Mildmay, P. St. John, M.P. .	21, Edw-st, Port-sq	Hasle Grove House, Sherborne, Dorset.
Miller, Rev. M. H.. . . .	. .	Scarborough, Yorkshire
Miller, William	. .	Water Eaton, nr Oxford
Millington, Bryan	. .	Asgarby, Sleaford, Lincolnshire
Mills, C. S..	. .	Newbury, Berkshire
Mills, Rev. William . . .	. .	Shellingford, Faringdon, Berks.
Mills, J.	. .	Ulceby Barton, Lincolnshire
†Milne, Alexander	Whitehall	
Milne, J. L.	. .	Hilgay Lodge, Downham, Norfolk
Milnes, R. Monckton, M.P. .	26, Pall Mall	Fryston Hall, Pontefract, Yorkshire
Monck, J. B.	. .	Coley Park, Reading, Berks.
Monckton, G.	. .	Stretton, Penkridge, Staffordshire
Montefiore, J. B.	16, Geo.-st. Ma.-ho.	
Moody, C. A.	. .	Kingsdown, Ilchester, Dorset.
Moor, Major Edward, F.R.S. .	. .	Bealings, Woodbridge, Suffolk
Moore, Rev. H.	. .	Willingdon, Eastbourne, Sussex
Mordaunt, Rev. C.. . . .	. .	Badgworth Cross, Axbridge, Somerset.
Morgan, George	. .	Biddlesden Park, Brackley, Northamps.
Morland, G. B.	. .	Abingdon, Berkshire
Morrell, James, Jun. . . .	. .	Headington Hill, Oxford
Morrell, Mark T.	. .	Oxford
Morrell, Frederick J. . . .	. .	Oxford
Morton, John Chalmers . .	. .	Chester Hill, Stroud, Gloucestershire
Mount, William	. .	Wasingplace, Newbury, Berkshire
Mountford, ——	. .	Barrows Farm, Lambourn, Berkshire
Mumford, George	. .	Downham-Market, Norfolk
Munday, S..	. .	Abingdon, Berkshire
Mundy, H.	. .	Andover, Hampshire
Mundy, J.	. .	Cullam, Abingdon, Berks.
Muskett, James	. .	LambsgreyFm. Dean Frst, Newnham, Gl.
Muskett, John	. .	Farnham, Bury St. Edmund's, Suffolk

Names.	Town Residence.	Country Residence.
Myers, T. Dynely	. .	Langford, Lechlade, Gloucestershire
Myers, Thomas	. .	Langford, Lechlade, Gloucestershire
Nalder, John	. .	North Moor, near Oxford
Nash, Joseph	. .	Reigate, Surrey
Nash, John	. .	Reigate, Surrey
Nash, W.	. .	Langley
Nash, Charles	. .	Royston, Hertfordshire
Neale, Stephen	. .	Tytherington, Warminster, Wiltshire
Neale, H. St. John	. .	Ringwood, Hampshire
Neame, Charles	. .	Selling, Faversham, Kent
Neame, Frederick	. .	Sellinge, Faversham, Kent
Neame, John	. .	
Neame, Thomas	. .	Canterbury, Kent
Neave, Sheffield	. .	
Neeld, ——	. .	Red Lodge, Cricklade, Wiltshire
Neeve, ——		
Nelson, Rev. Edward		
Nelson, Rev. J.	. .	Childrey, Wantage, Berkshire
Neve, John	. .	Benenden, Cranbrook, Kent
Neve, Thomas	. .	Tenterden, Kent
Newman, Charles	. .	Hayes, Uxbridge, Middlesex
Newnham, Henry	. .	
Newton, Marcellus	. .	Wareham, Hereford
Newton, M.	. .	Wareham, Hereford
Newton, Richard	. .	Britwel l, Watlington, Oxon.
Niblett, D. J.	. .	Haresfield, Stroud, Gloucestershire
Nicholds, M.	. .	Saffron-Walden, Essex
Nicholson, W. H.	1, Robert-st., Adel.	
Nicholson, Brady	. .	Wootton Barrow
Nicklin, Richard	. .	Tipton, nr Birmingham
Noakes, T.	. .	Warncocks, near Eastbourne, Sussex
Norreys, Lord, M.P.	40, Grosvenor-sq.	Wytham Abbey, Abingdon, Berkshire
Norris, W. John	. .	Radwell House, Baldock, Herts.
North, Frederick	. .	Rougham, Swaffham, Norfolk
North, Lieut.-Col.	. .	Wroxton Abbey, Oxon.
Northcote, Henry Stafford	University Club	Pyne's, Exeter, Devonshire
Northeast, Thomas	. .	Tedworth, near Andover, Hants.
Northey, Edward S.	. .	Epsom, Surrey
Nott, John	. .	
Noyes, Finch	. .	Lavoistock Hall, Salisbury
Noyes, Thomas H.	. .	East Mascalls, Lindfield
Oakley, Thomas	. .	Water End Farm, Sandridge, St. Alban's
Oakley, John	. .	Larkin Hall, Frindsbury, Rochester, Kt.
O'Brien, Stafford	. .	Blatherwick Park, Stamford, Lincolns.
Ogle, Henry	. .	Eastbourne, Sussex
Oliver, William	. .	
Oliver, John	. .	Abingdon, Berkshire
†Oliverson, Richard	14, Portland-place	
Olliver, James	. .	Handford, Blandford Forum, Dorset.
Orleback, R. Lonquest	. .	Henwick House, Beds.
Ormond, William	. .	Wantage, Berkshire
Osborne, C.	. .	Haling, Ensworth
Overman, C. E.	. .	Burnham Westgate, Norfolk
Overman, T. W.	. .	Maulden, Ampthill, Bedfordshire
Overman, W.	. .	Burnham Sutton, Burnham Westg. Norf.
Overman, Henry	. .	Weasenham, Fakenham, Norfolk

Names.	Town Residence.	Country Residence.
Owen, Thomas	. .	Kentbury, Newbury, Berks.
Packe, Rev. H.	. .	Twyford Hall, Guist, Reepham, Norf.
Padwick, Frederick	. .	West Thorney, Chichester, Sussex
Pagden, ——	. .	Eastbourne, Sussex
Page, William Woods	17, Wimpole-street	
Paget, George	. .	Sutton Bonnington, Kegworth, Leic.
Paget, Charles	. .	Ruddington, nr Nottingham
Paget, Henry	. .	Birtoll, Leicestershire
Pain, Philip	. .	Boughton House, Kettering, Northamp.
Paley, W. F.	. .	Gladdon, nr Leeds
Palmer, George, M.P.	11, King's Arms yd.	Nazing Park, Waltham Abbey, Essex
Palmer, William	. .	East-Garston, Lambourn, Berks.
Palmer, Henry	. .	Brightwaltham, East Ilsley, Berks.
Paicey, Robert	. .	Chedgelow, Tetbury, Gloucestershire
Parham, William	. .	Sutton-Veny, Warminster, Wilts.
Park, Rev. Waldegrave	. .	Ince Hall, Cheshire
Parker, Thomas A. W., M.P.	9, Conduit-street	Ensham Hall, Witney, Oxfordshire
Parker, Christopher C.	. .	Woodham-Mortimer, Maldon, Essex
Parker, Oxley	. .	Woodham-Mortimer, Maldon, Essex
Parker, Adm. Sir Hyde, Bart.	. .	Melford Hall, Long Melford, Suffolk
Parker, Henry	. .	Fairford, Gloucestershire
Parker, Rev. E.	. .	Bicester, Oxfordshire
Parker, Thomas W.	. .	Henley-on-Thames, Oxfordshire
Parker, William	. .	Oxford
Parker, William		
Parkes, J. W. H.	. .	Mawbey Gate, Southampton
Parkinson, John	. .	Leyfields, Ollerton, Notts.
Parkinson, Richard	. .	Muskham Villa, Newark, Notts.
Parratt, H. M.	. .	Effingham House, Leatherhead, Surrey
Parrott, G.	. .	Oxford
Parrott, ——	. .	Somers Town, near Oxford
Parry, Samuel	. .	Clanes, nr Worcester
Parry, G. F.	. .	Duisk Lodge, Ayrshire.
Parsons, John	. .	Oxford
Parsons, George	. .	West Lambrook, Langport, Somerset.
Parsons, J. M.	6 Raym. Bgs. Gry's I	
Partridge, Henry Samuel	. .	Hockham Hall, East Harling, Norfolk
Passand, Rev. J.	. .	Shipton Charwell, Woodstock, Oxon.
Passmore, Edward	. .	Hythe End Farm, Hythe, Kent
†Patterson, W. J.	. .	Durnford Lodge, Wimbledon, Surrey
Paul, W.	. .	Pentney, Lynn, Norfolk
Paull, Matthew	. .	Compton-Paunceford, Wincanton, Som.
Paxton, William	. .	Langford Farm, Bicester, Oxon.
Payn, William	. .	Kidwells, Berkshire
Peacock, John A.	. .	Osbourn-by-Folkingham, Lincolnshire
Peacock, A.	. .	Ranceby, Sleaford, Lincolnshire
Pearce, R. M.	. .	Hill Farm, Banbury, Oxon.
Pearse, George	. .	Harlington, Ampthill, Bedfordshire
Peel, Rev. F.	. .	Willingham, Lincolnshire
Peel, William	. .	Culham, Abingdon, Berkshire
Peel, Bolton	. .	Purley, Berkshire
Peel, Jonathan	. .	Culham, Abingdon, Berkshire
Peel, J.	. .	Culham, Abingdon, Berkshire
Peers, Charles	. .	Chislehampton, nr Oxford
Pell, William		
†Pell, Sir W. Owen	. .	Synell Hall, Northamptonshire
Pell, Edwin	. .	Synell Hall, Northamptonshire
Penoyre, Rev. L.	. .	The Moor, Hay, Herefordshire

Names.	Town Residence.	Country Residence.
Penson, Thomas	. .	Foscott, Oxford
Peppercorn, Henry	. .	Aylesford, Maidstone, Kent
Percival, Thomas	. .	Cranford, Hounslow, Middlesex
Percival, William	. .	Regent's Park Barracks
Perkins, Joseph	. .	Laughton, Market-Harborough, Leices.
Perkins, Henry	. .	Hanworth Park, Hounslow, Middlesex
Perkins, Frederick	. .	Chipstead-place, Sevenoaks, Kent
Perry, G. W.	Fore-street, City	
Peters, J. W.	. .	South-Petherton, Somerset.
Peyton, Henry	. .	
†Philips, J. Burton	10, Park Cresent	
†Philips, Sir George, Bart.	. .	Weston House, Chipping Norton, Oxon.
†Philips, George Richard, M.P.	12, Hill-st., Berk-sq.	
Phillipps, James	. .	Bryngwyn Ragland, Monmouthshire
Phillips, John	. .	Culham, Abingdon, Berkshire
Phillips, John	. .	Charnage Farm, Mere, Wilts.
Phillips, Joseph	. .	Ardington, Wantage, Berks.
Phillpotts, Rev. T.	. .	Gwennap, Cornwall
Phipps, George	. .	River, nr Dover, Kent
Phipps, Thomas Hele, Jun.	. .	Leighton House, Westbury, Wilts.
Picken, William	. .	Whitemoor, Ollerton, Notts.
Pickering, Leonard	. .	Wilcot, Witney, Oxfordshire
Pilcher, Charles	. .	Oxford
Pillans, William	. .	
Pinckard, T. T.	. .	Handley, Towcester, Northamptonshire
Pinfold, Charles	. .	Twine, Surrey
Pinfold, John	. .	Oxford
Pinney, William, M.P.	30, Berkeley-sq.	The Park, Somerton, Somersetshire
Pinnock, Rev. J.	. .	St. Madron, Penzance, Cornwall
Pinnock, Rev. H.	. .	Moroah, Penzance, Cornwall
Pittman, Rev. T.	. .	Eastbourne, Sussex
Platt, John Clarke	22, Ludgate-street	
Platt, George Edward	. .	Denne Park, Horsham, Sussex
Plestow, C. Berners	. .	Wattington Hall, Norfolk
Plummer, John	. .	Siddington, Cirencester, Gloucestershire
Plummer, James	. .	Ensham, nr Oxford
Pocock, Charles	. .	Sulham, Reading, Berkshire
Pocock, J. Hall	. .	Bothemstead
Polhill, William	. .	Eyford, Stow, Gloucestershire
Poole, Edward	. .	Hornend, Ledbury, Herefordshire
Pope, Edward	. .	Toller-Porcorum, Beaminster, Dorset.
Porter, Edward	. .	Moor Critchell, Dorset.
Porter, William	. .	Hembury Fort, Honiton, Devon.
Potter, R.	. .	Lydden Court, Dover, Kent
Potterton, J. Faulkner	. .	Stowe, nr Towcester, Northamptonshire
†Powell, Alexander	. .	Hurdcott House, Wiltshire
Powell, W.	. .	Mareham, Abingdon, Berks.
Pownall, H.	. .	
Powys, Henry	. .	Hardwicke, Oxford
Pratt, Sampson	. .	Bruern Abbey, Oxford
Pratt, William	. .	Newfield, Southam, Warwickshire
Pretyman, Rev. R.	. .	
Price, Thomas	. .	Gaer, nr Brecknock
Price, H.	. .	
Pridgold, H.	. .	
Punnet, Rev. J.	. .	St. Gotta, Cornwall
Purchas, R. W.	. .	Pilstone, nr Monmouth
Purratt, John	. .	Moins Farm, nr St. Albans, Herts.
Purser, John	. .	Willington, nr Bedford
Putland, John	. .	

Names.	Town Residence.	Country Residence.
Quantrell, ——	. .	Southampton
Quarrel, Thomas	. .	Crossthorne, Worcestershire
Randall, Richard	. .	Tunbridge Wells, Kent
Ransome, James	. .	Ipswich, Suffolk
Ransome, Robert	. .	Ipswich, Suffolk
Ransome, J. A.	. .	Yoxford, nr Ipswich, Suffolk
Rason, William	. .	Eastbourne, Sussex
Ravenhill, John	. .	Warminster, Wiltshire
Rawden, C. Wyndham	. .	Eastbourne, Sussex
Rawlence, G. C.	. .	Fordingbridge, Hants.
Rawlinson, A. F.	. .	Chadlington, Chipping-Norton, Oxon.
Reay, John, Jun.	. .	East Dulwich, Surrey
Rendlesham, Lord	. .	Rendlesham House, Wickham-Mk. Suk.
Rham, Rev. W. L., M.A.	. .	Winkfield, Bracknell, Berkshire
Rhodes, J. A.	. .	Horsforth Hall, Leeds, Yorkshire
Rice, James	. .	Cotton End, Northamptonshire
Rice, Edward Royd, M.P.	16, Suffolk-street	Dover, Kent
Rich, E. W.	. .	Didmarton, Tetbury, Gloucestershire
Richards, James	. .	Dumbleton, Whinchcombe, Gloucesters.
Richards, Rev. Thomas	. .	Aberystwith, Cardiganshire
Ricketts, Henry	. .	Brislington, nr Bristol
Riddell, Edward	. .	Cheeseburn Grange, Newcast.-on-Tyne
Ridgway, James	169, Piccadilly	
Riddick, William	. .	Cirencester, Gloucestershire
Ridley, Rev. C. J.	. .	University College, Oxford
Rigg, R.	2, Chatham-place	
Risley, Rev. W. C.	. .	Deddington, Oxfordshire
†River, John	. .	
Roberts, Robert	. .	Ranceby, Lincolnshire
Roberts, Joseph	. .	Waterperry, Wheatley, Oxon.
Roberts, ——	. .	
Roberts, John L.	. .	Ditchley, Sussex
Roberts, J.	. .	
Robertson, Daniel	13, Austin Friars	
Robins, B.	. .	East Lavant, nr Chichester, Sussex
Robins, Henry	. .	Asps, nr Warwick
Robinson, Thomas	. .	Oxford
Robinson, Rev. W. B.	. .	Lithington, Sussex
Rodd, F. H.	. .	Trebartha Hall, Launceston, Cornwall
Roden, George	. .	Sutton Madoc, Shiffnal, Salop.
Roe, Henry R.	. .	Graton Hall, Yealmpton, Devonshire
Rogers, H.	. .	Boston, Lincolnshire
Rogerson, John	Camden Town	
Rolfe, John	. .	Beaconsfield, Buckinghamshire
Rolls, John E. W.	. .	
Romilly, Edward	Somerset House	
Ross, Rev. A.	. .	Westwell Vicarage, Maidstone, Kent
Round, Charles Grey, M.P.	102, Regent-street	Birch Hall, Colchester, Essex
Round, John, M.P.	. .	Danbury Park, Chelmsford, Essex
Rowland, Richard	. .	Creslow, Buckinghamshire
Rowland, William	. .	Water Eaton, nr Oxford
Rowles, Charles	. .	Ledwell Farm, Woodstock, Oxon.
Rowley, R. C.	. .	Holberks, Hadleigh, Suffolk
Ruck, Edmond	. .	
Rumbold, Charles E., M.P.	22, Chapel-street	Preston Candover, Basingstoke, Hants.
Rusbridger, John	. .	Goodwood, Chichester, Sussex
Rusbridger, George	. .	Goodwood, Chichester, Sussex
†Russell, Lord Chas. J. F., M.P.	6, Belgrave-square	Drakeloe Lodge, Woburn, Bedfordshire

Names.	Town Residence.	Country Residence.
Russell, T. A.	. .	Cheshunt Park, Waltham Cross, Herts.
Ryde, W. H.	. .	Aylesbury, Buckinghamshire
Sadler, Henry	. .	Lavant, Sussex
St. John, Lord	. .	Melchbourn, Higham Ferrars, Bedfords.
†St. Alban's, Duke of	80, Piccadilly.	Redbourne Hall, Brigg, Lincolnshire
Salomons, David	. .	Broom Hill, Tonbridge, Kent
Salter, T. F.	. .	Great Hallingbury, Essex
Sampson, John	. .	Brympton, Somerset.
Sampson, Benjamin	. .	Tulley Main, nr Truro, Cornwall
Sanctuary, Thomas	. .	Nunnery, nr Horsham, Sussex
Sanders, Henry	. .	Harlestone, nr Northampton
Sanders, Randle	. .	Nimwick House, Cumberland
Sanderson, John	. .	Sunbury, Middlesex
Sandham, Major	. .	Rowdell, Shoreham, Sussex
Sandon, Lord	41, Grosvenor-st.	Norton House, Campden, Staffords.
Sanold, S.	. .	Great Cawseston House
Sargeant, Edward	. .	Stamford, Lincolnshire
Sargeant, Rev. John	. .	Stanwick, Wellingboro', Northampton.
Sarney, E.	. .	Soundess, Oxford
Satterfield, Joshua	. .	Green Heys, Manchester
†Saunders, Thomas Bush	6, Brompton-square	Bradford, Wiltshire
Saville, G., Jun.	. .	Cottesmore, Rutlandshire
Savill, Samuel	. .	Bocking, Essex
Savours, William	. .	Headington, Oxford
Sawbridge, Henry B.	. .	East Haddon, Northampton
Scales, John	. .	Hilloughton, Norfolk
Scarth, Jonathan	. .	Shrewsbury, Salop.
Scobell, Capt. R.N.	. .	High Littleton, Bath
Scotson, Samuel	. .	Toxteth Park, Liverpool
Scott, George Denistoun	. .	Lovel Well, Sunninghill, Windsor, Berks
Scudamore, Lieut.-Colonel	. .	Kentchurch Court, Hereford
Seabrook, ——	. .	Boreham, Essex
Seawell, Henry	. .	Little Bookham, Surrey
Seawell, Thomas Samuel	. .	Marelands, nr Farnham, Surrey
Selmes, Samuel	. .	Beckley, Sussex
Senior, J. T.	. .	Broughton House
Sewell, Professor	Royal Veter. Collg.	
Sharpe, James	. .	Fawley Court Farm, Henley, Bucks.
Sharwood, Dendy	120, Aldersgate-st.	Clapton
Shaw, William, Jun.	. .	Hemsbury Hill, Northampton
†Shawe, R. Fleetwood	. .	Brantingham, Hull
Shawe, R. N.	. .	Kesgrave Hall, Woodbridge, Suffolk
Shawe, S. P.	. .	Hints Hall, Staffordshire
Sheen, Richard.	. .	Oxford
Sheepshanks, Archdeacon	. .	Gluvias, Cornwall
Sheldon, William	. .	Stanton St. John, Oxford
Sheldon, Jonathan	. .	Ensham, nr Oxford
Sheldon, William	. .	Stratford-upon-Avon, Warwickshire
Sherborn, George	. .	Ashford, nr Staines, Middlesex
Sherborn, Francis	. .	Bedfont, Middlesex
Sherwood, ——	. .	Purley, Berkshire
Sherratt, John	. .	Lichfield, Staffordshire
Shift, R. E. D.	. .	Whitworth Park, Durham
Shitler, John	. .	Bradford Farm
Short, T.	. .	Martin, nr Bawtry, Notts.
Shrub, James	. .	Dorchester, Oxfordshire
Shute, ——	. .	Frampton, Cothill, Bristol
Silvertop, G.	. .	Minsteracres, Northumberland
Simonds, J. B.	. .	Twickenham, Middlesex

Names.	Town Residence.	Country Residence.
Simonds, W. Barrow	. .	St. Cross, nr Winchester, Hants.
Simmons, James	. .	Sutton-Wick, near Abingdon, Berks.
Simpson, H. Bridgman, Jun.	1, Saville-row	Eaton, Retford, Notts.
†Simpson, Hon. John B.	. .	Babworth Hall, Retford, Notts.
Simpson, John	. .	Bardwell, Suffolk
Sims, John		
Sinnell, Richard		
Sitwell, Rev. H. W.	. .	Leamington, Hastings, Dunchurch
Skirving, W.	. .	Walton
Slack, J. Albin	. .	Redburn House, St. Albans, Herts.
Slapp, Rev. Thomas Peyton	. .	Old Buckenham Ldg. Attleburgh, Nfk.
Slatter, William	. .	Stratton, nr Cirencester, Gloucestershire
Slater, John J., Jun.	. .	Haslebeech, Northamptonshire
Small, Henry	. .	Barfoot, Dorset.
Smallbones, Richard H.	. .	Woodstock, Oxfordshire
Smith, Sir Culling Eardley, Bt.	. .	Bedwell Park, nr Hatfield, Herts.
Smith, J. Hogan	. .	Forberry Grove, nr Newbury, Berks.
Smith, Sir John Wyldbore, Bt.	. .	Denver House, Blandford, Dorset.
Smith, Robert	. .	Heath Farm, St. Alban's, Herts.
†Smith, J. James	. .	Denver House, Blandford, Dorset.
Smith, Charles Brent	. .	Whaddon, Gloucestershire
Smith, James	. .	Stanstead, Sussex
Smith, Alexander	. .	Cirencester, Gloucestershire
Smith, F.	. .	Hales Owen, Grange, Birmingham
Smith, Henry	. .	Drax Abbey, York
Smith, ——	. .	Coton, nr Northampton
Smith, J. P.	. .	Wick, nr Worcester
Smith, Robert	. .	Bingley-on-the-Hill, Oakham, Rutland.
Smith, William	. .	Hemel-Hemstead, Herts.
Smith, W.	. .	West Rasen, Lincolnshire
Smyth, George		
Symthies, Carleton	. .	Eye, Suffolk
Smythies, Rev. J. R.	. .	Lynch Court, nr Leominster, Hereford.
Snow, Benjamin	. .	Sleaford, Lincolnshire
Snow, Johnson	. .	Evenden, Lincolnshire
Snowden, Rev. C. C.	. .	Slooe, Sussex
Solly, Samuel, F.R.S.	48, Up. Gower-st.	
Somes, Samuel	. .	Wollaston, nr Wellingboro'
Souhter, George	. .	Box Grove, near Chichester, Sussex
Sparks, William	. .	Crewkerne, Somerset.
Sparks, J.	. .	Loseley, Guildford, Surrey
Speakman, Robert	. .	Oxford
Spearman, ——	. .	Newton Hall, Durham
†Spencer, Hon. Capt., M.P.	. .	Althorp, nr Northampton
Spencer, William	. .	Adderbury, Oxfordshire
†Spencer, Hon. F.	6, King-st. St. James	
Spicer, Thomas	. .	Bockhampton, Berks.
Spicer, John	. .	Esher-place, Surrey
Spooner, C.	Royal Veter. Collg.	
Spooner, Richard	. .	Worcester
Stace ——	. .	Berwick, Sussex
Stacey, William	. .	Burton Farm, Abingdon, Berks.
Stallard, Joseph	. .	Redmarley, Gloucestershire
Staples, John	. .	Highlands, near Dartford, Kent
Stanier, John	. .	Leaton, nr Wellington, Salop.
Stanley, Edward	14, Grosvenor-sq.	
Starling, Robert	14, Norf.-st., Islin.	
Starr, John	. .	Eastbourne, Sussex
Stedman, Gill	. .	Pakenham, Suffolk
Steel, William	. .	Abergavenny

Names.	Town Residence.	Country Residence.
Stephens, William		Prospect Hill, Reading, Berks.
†Steuart, Robert, M.P.		Alderston, Haddingtonshire
Stokes, Charles		Kingston, Keyworth, Notts.
Stokes, Charles		Munnell's End, Redmarley Dabital, Wor.
Stokes, Frederick		Woodfields, Ross, Hereford.
Stokes, J. Allen		Kervington, nr Evesham, Worcestershire
Stokes, John		Pauntley, Gloucestershire
Stone, George		Tyfield Wick, Berkshire
Stone, Mark		Tyfield Wick, Berkshire
Stone, W.		Sweetley House, Reading, Berks.
Stone, W. Lowndes		Brightwell, Oxfordshire
Strafford, Henry	7, Brecknock-cres.	
Stratton J. Locke		Farthinghoe Lodge, Brackley, Northam.
Strickland, Walter		
†Stringer, Miles		Effingham Hill
Strong, W.		Hardingstone
Stronge, Thomas		Cirencester, Gloucestershire
Stroud, Henry		Speltesbury, nr Blandford, Dorset.
†Sturt, H. C.	16, Portman-sq.	Cricket Woodgates
Sumner, Rev. C. V. Holme		
Sumner, W. H.		Hatchland Park, Guildford, Surrey
Sutherland, J. W.		Roydon, Surrey
Swann, James		Ensham, nr Oxford
Tabor, C.		Bocking, Essex
Tanner, William		Patcham, nr Brighton, Sussex
Tatham, T. D. Fearon		
Tattershall, John	46, Lw Belgrave-pl	
Taunton, W. P.		Bristol
†Tawney, Charles		Oxford
†Tawney, Henry		Banbury, Oxfordshire
Taylor, Sir Charles, Bart.		Holly Combe Lodge, Liphook, Hants.
Taylor, Walter		Hockley, nr Alresford
Taylor, John		Bolas, Salop.
Taylor, Thomas		Church Hill, Oxfordshire
Taylor, Thomas		Burleigh Villa, Salop.
Templeman, John		Crewkerne, Somersetshire
Thackrah, George		Feltham, Middlesex
Theobald, George		Starston, Norfolk
Thimbleby, William		East Kirby, nr Bolingbroke
Thomas, James		Lidlington, nr Woburn, Bedfordshire
Thomas, Rev. V.		Oxford University
Thomson, Guy		Oxford
Thompson, H. S.		Kirby Hall, Boroughbridge, Yorkshire
†Thompson, Chas. Poulett, MP.	13, South Audley-st	
Thompson, R. T.		Kirby Hall, Boroughbridge, Yorkshire
Thompson, William C.		Abingdon, Berks.
Thornhill, Thomas		Woodleys, Woodstock, Oxon.
Thornton, Stephen		Moggesharges House
Thorold, B. H.		Harmonston Hall, nr Lincoln
Thoyts, M. G.		Sulhamstead House, nr. Reading
†Throgmorton, R. G.		Buckland, nr Faringdon, Berks.
Thurston, Capt. C. T., R. N.		Machyulleth
Tilden, John		Ifield Court, Gravesend, Kent
Tillyer, James		Harmondsworth, Middlesex
Tillyer, George		Feltham, Middlesex
Tindale, Benjamin		Ewerby, Lincolnshire
Tindall, Thomas		

Names.	Town Residence.	Country Residence.
Tollet, George	. .	Botney Hall, Newcastle-under-Lyne
Toovey, Henry	. .	Hambleden, Henley-on-Thames
Toovey, Thomas	. .	Joyce Grove, Oxon
Toovey, William	. .	Crowmarsh, Wallingford
Toovey, William	. .	Newnham, Oxon.
Torkington, James	. .	Fukely, Huntingdon
Torr, William, Jun.	. .	Riby, nr Caister
Torr, Edward	. .	Kingsbridge, Devon.
Tovey, Henry	. .	Stanton, Wilts.
Towers, John	. .	Pinkney's Green, nr Maidenhead
Townsend, John	. .	Oxford
Toynbee, George	. .	Hickington, Lincolnshire
Treby, Henry Hall	. .	Cobham Lodge, Cobham, Surrey
Tremenheere, H. Pendarves	. .	Penzance, Cornwall
Trenchard, Rev. J.	. .	Staunton House, Heighworth, Wilts.
Trevor, Hon. General	. .	Glynde, nr Lewes, Sussex
Treweeke, Rev. G.	. .	Illogan, Cornwall
Tredgold, Henry	. .	Chilbolton, Hants.
Trinder, William	. .	Wantage, Berks.
Trinder, Daniel	. .	Cirencester, Gloucestershire
Trotter, John	. .	Staindrop, Durham
Trower, Henry S.	. .	Castle Thorpe, nr Stony Stratford
Trumper, William	. .	Ives, Buckinghamshire
Trumper, James	. .	Southall, Middlesex
Trumper, Edward	. .	Newnham Park, nr Oxford
Tuckey, Thomas	. .	Compton-Beauchamp, Faringdon
Tuckwell, Humphry	. .	Signet, nr Burford, Oxon.
†Tudway, C.	. .	Wells, Somerset.
Tull, Edward	. .	Peasemore, Newbury, Berks.
Tull, Richard	. .	Crookham, Berkshire
Turner, George	. .	Barton Alphinton, nr Exeter, Devon.
Turner, William	. .	Shipton, nr Woodstock, Oxon.
Turner, Vincent John	. .	Shipton, nr Woodstock, Oxon.
†Turner, Chas. Hampden, FRS.	. .	Rooksnest, Godstone, Surrey
Turner, James	. .	Oxford
Turner, ——	. .	Shoreham
Turney, W.	. .	
†Turnor, Christopher	. .	Stoke, Grantham, Lincolnshire
Twynam, J. T.	. .	Whitchurch, Hants.
Twynam, Thomas	. .	Bishopstoke, nr Winchester, Hants.
Twynham, Dr.	. .	Lainston House, nr Winchester
Umbers, Thomas	. .	Wappenbury, Warwickshire
Umbers, William, jun.	. .	Wappenbury, Warwickshire
Umbers, William	. .	Weston Hall, nr Leamington, Warw.
Umbers, Samuel	. .	Dunton Hall, Coleshill, Warw.
Unwin, Stephen, jun.	. .	Coggeshall, Essex
Upperton, Edward F.	. .	Thakenham, nr Stowington
Uppleby, L.	. .	Wooton Hall, Lincolnshire
Uppleby, William	. .	Bonby, Barton
Upton, Henry	. .	Aldwick, nr Bognor, Sussex
Vaisey, Thomas	. .	Stratton, nr Cirencester, Gloucestershire
Vaizey, George	. .	Halstead, Essex
Valance, J.	. .	
Vandersegen, W. H.	. .	Cane End House, Oxon.
†Vane, Rev. J.	. .	Dulwich, Surrey
Vaughan, James	. .	Osney Mill, Oxford

Names.	Town Residence.	Country Residence.
Vaughan, Rev. T.	. .	Llandwailog, Brecon
Venables, Charles	. .	Woburn, Beaconsfield, Bucks.
†Verney, Sir Harry, Bt., M.P.	. .	Claydon House, Bucks.
Vevers, William	. .	Donnington Court, Herefordshire
Villiers, Lord	38, Berkeley-sq. .	
Viall, King	. .	Stoke, Clare, Suffolk
Vines, R.	13, Grt. College-st.	
Villebois, F.		
Waite, J. U.	. .	Sibsey, nr Boston, Lincolnshire
Wake, Sir William, Bart.	. .	Courteen Hall, Northampton
Wakefield, John	. .	Sedgwick House, Kendal, Westm.
Walesby, Prime	. .	Ranceby, nr Horncastle, Lincolnshire.
Walker, George	. .	Greenfield Lodge, Strixton.
Walker, James	. .	Northleach, Gloucestershire
Walker, John	. .	Barton, nr Worcester
Walker, Rev. Henry	. .	Heathfield House, nr Oxford
Wall, J. Ankley	Belgrave-square.	
Wallace, W. T.	. .	Shifford, nr Witney, Oxon.
Wallis, Owen	. .	Overstone, Northamptonshire
Waller, H. S.	. .	Farmington, Northleach, Gloucester.
Waller, Rev. R.	. .	Bourton, Gloucestershire
Wallington, James	. .	Charlecote, nr Warwick
Walpole, William		
Walsh, Sir John, Bart., M.P.	. .	Warfield House, Berks.
Walsh, John	. .	Oxford
Walsh, Henry	. .	Oxford
Walters, J. W.	. .	Barnwood, Gloucester
Warburton, Hen., M.P., F.R.S.	45, Cadogan-place	
Ward, Henry George, M.P.	34, St. James's-pl.	Gilston Park, Harlow, Essex
Warner, William M.	. .	Thumbly, nr Thame, Oxon.
Warre, J. Ashley, M.P., F.R.S.	7, Belgrave-square.	
Warrender, Sir G. Bart. F.R.S.	. .	Clifden House, Maidenhead
Warrington, L.	. .	Witney, Oxon.
Warriner, G.	. .	Bloxham Grove, near Banbury, Oxon.
Warry, George	. .	Shapwick, Glastonbury
Wasey, John F.	. .	Prior's Court, nr Newbury, Berks.
Wasey, C.	. .	Prior's Court, nr Newbury, Berks.
Washbourne, T. E.	. .	Spenhamland, Newbury
Washbourne, E. B.	. .	Spenhamland, Newbury
Waters, Thomas	. .	Stratford Sub-Castle, Salisbury
Watkins, Lloyd	. .	Penoyres, nr Brecknock
Watson, Colonel Henry	. .	Walkeringham, nr Bawtry
Weall, Thomas	. .	Woodcote Lodge, Beadington
Webb, William	3 Arundel-st. Strand	
Webb, Jonas	. .	Babraham, nr Cambridge
Webb, G.	. .	Beaumont Hall, nr St. Alban's
Webb, Daniel	. .	Kiddington, Woodstock, Oxon.
Webb, Edward	. .	Adwell, near Tetsworth, Oxon.
Webb, Charles	. .	Oxford
Webb, Richard		
Webb, S.	. .	Stowe Lodge, Ipswich
Webb, Thomas	. .	Melshott, near Salisbury, Wilts.
Webster, Lady	. .	Battle Abbey, Sussex
Webster, Joseph	. .	Penns, nr Birmingham
Wedge, Francis	. .	Badminton, Gloucestershire
†Weeding, Thomas	47, Mecklenbrg-sq.	
Weeks, Frederick	. .	Hurstpoint, nr Brighton
Welch, Alfred	. .	Southall, Middlesex
Welland, Charles	. .	

Names.	Town Residence.	Country Residence.
Wells, Thomas		Hampnett, Northleach, Gloucestershire
Wells, Fleetwood		Ellsborough, near Andover, Hants.
Welstead, Benjamin		Kimbolton, Huntingdon.
Welton, Cornelius		Woodbridge, Suffolk
Wentworth, Godfrey W.		Woolley Park, Wakefield
West, John		Miningsby, near Horncastle
Westbury, Giles		Andover, Hants.
Western, Lord	35, South-street	Felix Hall, Kelvedon, Essex
Westhead, John		Manchester
Wetherell, William		Durham
†Weyland, John, F.R.S.		Woodrising Hall, Norfolk
Weyland, Richard		Woodeaton House, nr Oxford
Whieldon, George		Welton, Northamptonshire.
White, Joseph		Ampfield House, Romsey
White, Thomas		Berechurch Hall, nr Colchester
White, Robert		Mere, Wiltshire
White, John M.		Warminster, Wiltshire
Whitear, Rev. W.		Harleston, Norfolk
Whitehorne, Thomas		Bampton
Whitfield, W.		
Whitington, George		Whitmore House, Ripley, Surrey
Whitlaw, C.	30, Argyll-street	
Whitling, Henry John	16, Berners-street	
Whittle, John		Toller Tornsum, Dorset.
Wickham, ——		
Wickham, James		Sutton Sidney, Whitchurch
†Wickens, James Stephens	35, Mortimer-street	
Wicksted, Charles		Brand, Market Drayton
Wiggins, John	30, Tavistock-place.	Hillsborough, Downshire
Wiley, Samuel		Bransby, nr York,
Wilkinson, Rev. F.		Eastbourne, Sussex
Wilkinson, George		Wolveston, Stony Stratford
Wilkinson, Capt. T. H.		Walsham, Suffolk
Willan, William		Rickling, Bishop's-Stortford
Willis, William		Astrop House, Northampton
Williams, G. T.		Ilminster, Somerset.
Williams, John		Buckland's, Berkshire
Williams, Richard		Shifford, Oxfordshire
Williams, William		Skethrog, near Brecknock
Williams, Rees		Manest Court, nr Brecknock
†Willoughby, H.		
Wilmot, Sir E., Bart., M.P.		Berkswell Hall, Warwick
Wilson, Rev. John		Wood House, Oxford
Wilson, Hon. Henry		Alecto Hall, Leicestershire
Wilson, Christopher		Rigmaiden Park, Westmoreland
Wilson, Edward		Abbot Hall, Kendal
Wilson, J. H.		The Grange, near East Grinstead
Wilson, Thomas		Brackley, Northamptonshire.
Winder, J. W. Lyon		Horstead House. Norwich
Windham, J. W., Jun.		
Windham, William, Jun.		Dinton, Salisbury, Wilts.
Wing, F.		
Wing, William, Sen.		Steeple Aston, Woodstock, Oxon.
Wing, William, Jun.		Steeple Aston, Woodstock, Oxon.
Wing, T.		Thorney Abbey, Peterboro'
Wingate, Thomas		Owmby, nr Caister
Winnall, John		Berrow, nr Tewkesbury, Worcester
Winnal, Thomas		Eccleshall Court, Ross, Hereford.
Wippell John		Exminster, Devon.
Wither, Rev. L. B.		Manydown Park, Basingstoke

Names.	Town Residence.	Country Residence.
Withers, Richard	. .	Gussage, St. Michael's
Witt, James	. .	Denny Abbey, Cambridge
Wittenstall, W. F.	. .	Langley Bury, Watford, Berks.
Wodehouse, E., M.P.	. .	Wymondham, Norfolk
Wolfe, R. B.	. .	Wood Hall, nr Newport, Essex
†Wood, Charles, M.P.	. .	Ickleton Hall, Doncaster
Wood, George	. .	
Wood, George James	. .	Adminster, Dorset.
Wood, H.	. .	Bramdean House, Alresford
Wood, Jonathan	. .	Holt Farm, St. Alban's Herts.
Wood, John	. .	Milton, nr Woodbridge, Suffolk
Wood, John	. .	Fordhouse, nr Nervent, Gloucester.
Wood, James	. .	Twineham, Cuckfield, Sussex
†Wood, John	28, Chester-street	Heath Farm, Cassiobury
Wood, William	. .	Buttsbury, nr Ingatestone, Essex
Wood, G.	. .	South Dalton, Beverley, Yorkshire
Wood, Rev. W.	. .	Staplegrove, Taunton
Woodman, Henry	. .	Slitchcomb, Wilts.
†Woods, W. L.	. .	Chilgrove, Sussex
Woodward, F.	. .	Little Comberton, Worcestershire
Woodward, William	. .	Bredons Norton, Tewkesbury
Woolff, Rev. G.	. .	Guinear, Cornwall
Worrall, George	. .	Frenchay, Bristol
Worlledge, John	. .	Ingham, nr Bury St. Edmund's.
Worthington, Richard	. .	Brookhurst, nr Coventry
†Wratislaw, William Ferdinand	. .	Rugby, Warwickshire
Wreford, William	. .	Bristol
Wright, John	. .	Lew, near Witney, Oxon.
Wright, Robert.	. .	Norwich
Wyatt, Thomas, Jun.	. .	Oxford
Wyatt, George	. .	Chedham, Emsworth, Hants.
Wylde, Rev. William	. .	Woodborough, nr Pusey
Wynford, Lord	. .	Leesons, nr Chiselhurst, Kent
Wynniatt, Rev. R.	. .	Enitong Grange, Gloucester
Yates, John.		
Yeatman, Rev. H. F.	. .	Stool House, Sturminster
Yeld, W. W.	. .	Armitage, Rudgeley
Yelloly, John, M.D., F.R.S.	. .	Woodton Hall, Norfolk
Young, Matthew	. .	Begbrooke, nr Woodstock
Young, Rev. B.	. .	Wartling, Sussex
Zetland, Earl of	. .	Uppleatham Hall, Gainsboro'.

HONORARY MEMBERS.

Stevenson, Andrew, Esq., United States Minister.

Weyer, M. Van de, Belgian Minister.

ENGLISH AGRICULTURAL SOCIETY,

1839—1840.

English Agricultural Society.

GENERAL MEETING,

5, Cavendish Square, December 14, 1839.

REPORT OF THE COMMITTEE.

The Committee of Management have the satisfaction of presenting to the General Meeting a most favourable Report of the present state of the Society, and of the rapid, but secure establishment of the principles on which it has been founded, and whether in the increase of the number of its members, the state of the finances, or the favourable reception of the periodical Journal, as the medium of communication for its Papers,—the Committee have the pleasure of submitting under each of these heads the most satisfactory statements, in detail, to the subscribers.

The Finance Committee have laid before the general Board the most clear and ample details respecting every branch of revenue, expenditure, and contingent assets and claims on the funds. These documents will be laid before you this day, and a summary of their results will be printed as a balance-sheet in the forthcoming number of your Journal.

It may be only necessary to remark in this place, that the funded property of the Society consists of 4000*l.* stock, in the New 3½ per Cents., with a current cash balance of 504*l.* 1*s.* 11*d.*, besides a large amount of unpaid subscriptions, respecting the payment of which the Committee entertain no doubt; the outstanding bills not yet presented for payment being estimated at 187*l.* It also appears that the available income of the Society may be estimated at 2666*l.* per annum, exclusive of what may arise from the subscriptions of new members. The premiums offered for the ensuing year amount to the sum of 1000 guineas. The Finance

Committee have also completed their examination and settlement of the whole of the accounts relative to the Oxford Meeting, a balance-sheet of which is now laid on the table, and a copy directed to be sent for the use of each member of the Committee of Management. The Committee cannot report this termination of their transactions with the City of Oxford without expressing, in the strongest terms, their thanks to the members of the University and Corporation in general, for the interest they evinced in their proceedings, and their support and promotion of the objects of the Society, and they would especially record their sense of the favour shown them by the Vice-Chancellor, the Provost and Fellows of Queen's College, the Professor of Geology, the Mayor and civil authorities, and the co-operation of the Local Committee on that occasion.

The Society having been invited by the nobility and gentry of Cambridge to hold their next meeting in that town, the Sub-Committee appointed to take preliminary steps for the requisite arrangements for the meeting in July next, having presented a Report after a deputation to Cambridge, recommending Parker's Piece as a suitable site for the meeting, the Committee of Management have resolved to erect on that space of ground a temporary building for the cattle-yard, and also a dinner-room capable of accommodating at least two thousand persons.*

The Committee have also passed the following resolutions, in reference to the exhibition of stock:—

1st. That no animal which won a first prize in any class at the meeting at Oxford, shall be allowed to compete for a similar premium at Cambridge.

2nd. That any person who shall have been proved, to the satis-

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* The Master of Downing College having communicated to his Grace the Duke of Richmond, in the most handsome and liberal manner, the wishes of himself, and the Professors and Fellows of Downing College, that the English Agricultural Society would accept the offer of the Quadrangle of that College for the purpose of their great Dinner at the Cambridge Meeting, the Committee of Management have rescinded their former Resolution, and have unanimously accepted this invitation.—The day of the Meeting is fixed for Wednesday the 15th of July.

faction of the Committee, to have been excluded from showing for prizes at the exhibition of any society, in consequence of having been convicted of an attempt to obtain a premium by giving a false certificate, shall not be allowed to compete for any of the prizes offered by this Society.

3rd. That in case any gentleman or number of gentlemen wish to offer a prize for any class of stock not specifically named in the prizes offered by the Society, that he or they may be permitted to do so at the next Cambridge meeting, and the stock which shall compete for such prize shall be exhibited subject to such conditions as shall be decided upon by the Committee, and the prize awarded by such of the Judges as the Committee shall select. Animals exhibited for such prizes shall not be prevented from competing for any of the prizes offered by the Society for which they are qualified.

4th. That all sheep exhibited for the prizes shall have been really and fairly shorn between the 1st of May and the 1st of July next previous to the day of show.

With regard to the distribution of the Journal, every effort has been made to place the copies free of expence in the hands of the subscribers throughout the kingdom, but it having appeared, however, that in some cases they have not duly reached their destination, the Society, on being informed of any omission in their delivery, will give immediate directions for such copies to be sent direct to the parties so requiring them. They have also to announce that the arrangements are completed for the new Number of the Journal, and that it will make its appearance on the 1st of February.*

The English Agricultural Society having held out an offer to receive communications from local agricultural associations, and

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* His Grace the Duke of Richmond, as President of the Society, suggested to the Meeting a mode for the distribution of the Journal, subsequently adopted by the General Committee on the 15th of January, as the simplest and most efficient arrangement for placing the copies in the hands of the subscribers, free of expence, and with the greatest security and least loss of time. The announcement of this plan is made at the commencement of the present Number of the Journal.

received from various societies intimations of a desire to be in such relation to this Society, the Committee, in reference to a distinct application recently made to the Committee by Sir Charles Lemon, on behalf of the Cornwall Agricultural Society, have Resolved,—That for the purpose of further promoting the objects for which the English Agricultural Society was founded, it is expedient to receive communications from local societies upon subjects solely connected with these objects, presenting to such societies a copy of the Journal whenever any Paper communicated by them to the Journal Committee shall have been deemed suitable for publication, the standing type being also placed at their disposal for printing off as many private copies of the Paper as may be required for distribution among their own members.

In order to offer to the various members of the Society visiting the metropolis during the Smithfield-Show week an opportunity of assembling in the Society's rooms, the Committee have publicly announced, this year, the circumstance of the rooms in Cavendish-square being thrown open every evening for their accommodation.

In consequence of the vacancy occurring in the Committee of Management, by the unavoidable resignation of the Speaker of the House of Commons, the Committee availed themselves of the opportunity of electing Mr. Shaw, your late Secretary, to fill the vacancy thus occasioned in the requisite number of members in that Committee.

The Committee beg to distinctly acknowledge the donations made to the Society of agricultural books, specimens, implements, and other suitable presentations in accordance with the objects and principles of the Society, which, by further additions, they trust will eventually become a valuable source of reference for the members of the Society at large.

The English Agricultural Society consists at this time of 2007 members.*

RICHMOND, President.

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* At the present date, the total number of subscribers has amounted to 2172: the Society now consisting of 79 Life-Governors, 187 Governors, 112 Life Members, 1792 Members, and 2 Honorary Members.—Jan. 29, 1840.

STATEMENT OF THE RECEIPTS AND EXPENDITURE OF THE ENGLISH AGRICULTURAL SOCIETY,

From the period of its formation, in MAY, 1838, to the 1st DECEMBER, 1839.

RECEIPTS.			£. s. d.
By Life Governors' Compositions			3947 10 0
Life Members' Compositions			1021 10 0
			4969 0 0
By Annual Subscriptions from Governors, received in 1838		£650 5 0	
" " " in 1839		380 0 0	
		1030 5 0	
From Members, received in 1838	356 14 0		
" " 1839	992 15 0		
" in advance for 1840	11 0 0		
		1360 9 0	
			2390 14 0
			7359 14 0
By Dividends on the Permanent Investment,—			
due on the 5th of Jan. 1839		34 9 7	
due on the 5th of July, 1839		51 18 4	
			86 7 11
			£7446 1 11

NOTE.—There are Subscriptions due, for the year 1839, not yet received,—

From Governors	£514
From Members	606
	1120
And in Jan. 1840, there will be a further Dividend due on the Permanent Investment for Half a Year's Interest	70
Further assets due and forthcoming	£1190

	£7446 1 11

EXPENDITURE.		£. s. d.
For the Charges of Management; viz.—		
Advertisements	£149 19 4	
Stationery, Postages, Carriage of Parcels, Books, Maps, &c.	168 16 4	
Printing and Lithography	277 10 3	
Salaries to the Secretary and Editor (including Clerk), Housekeeper, &c., to the 1st November, 1839	441 0 0	
Rent paid to Michaelmas, 1839	450 0 0	
Miscellaneous Payments for Meetings at Taverns, Coals, &c.	49 10 0	
		1536 15
For the Amount of Prizes distributed,—		
For Essays	70 0 0	
For 62 Prizes distributed at Oxford	868 0 0	
		938 0 0
For the Cost of Furniture, &c.		155 9 10
For the Oxford Meeting in July, 1839; being the Balance due thereon, for an excess of payments over the receipts	293 19 7	
For further Disbursements by Mr. Shaw	13 0 4	
		306 19 11
Total Amount of Payments		2917 5 8
For the Balance in favour of the Society on the 1st of December, 1839, which is thus accounted for: viz.—		
By the Permanent Investment for the purchase in the New 3¼ per cents., £1970 8 10 stock, cost in money	2000 0 0	
996 5 3 ditto ditto	1000 0 0	
1033 5 11 ditto ditto	1024 5 1	
£4000 0 0 stock, which cost	£4024 5 1	
By Cash in the hands of Messrs. Drummond, bankers	476 1 11	
By Cash in the hands of Messrs. Parsons, Oxford bank	6 3 0	
By Petty Cash in the hands of the Secretary	22 6 3	
		4528 16 3
		£7446 1 11

NATH. W. SYMONDS, *Accountant.*

London, 4th Dec. 1839.

SUMMARY STATEMENT OF THE RECEIPTS AND EXPENDITURE OF THE ENGLISH AGRICULTURAL SOCIETY, AT THE OXFORD MEETING HELD IN JULY, 1839.

RECEIPTS.	£.	s.	d.
To the Sale of 2385 Tickets for the Dinner	1158	10	0
The Amount of Receipts for Admission to the Cattle-Yard	1235	14	2
Mem.—2317 Tickets were sold at 10*s.* . . . £1158 10*s.* 68 issued to the Judges' Visitors and Reporters were not paid for. 2385			
To the Balance of this Account, being an excess of Payments over the Receipts, and charged to the General Account of the Funds of the English Agricultural Society	293	19	7
	£2688	3	9

EXPENDITURE.	£.	s.	d.	£.	s.	d.
Dinner Expences.						
By paid to Mr. Griffith for 2420 Dinners, at 10*s.* each	£1210	0	0			
Less for an Allowance made by him towards the Expences of Fiting-up the Room, at 2*s.* 6*d.* each	302	10	0			
				907	10	0
Expences of Fitting-up the Quadrangle of Queen's College.						
By paid Matthew and Hudson, as per Contract, for the Building and Fitting-up the Room; extra Fitting-up the Cloisters, including 30*l.* for Lighting, and for Tanstrewing the High-street, and removing the same, and Beer for the Men	648	2	0			
Paid Mr. Edgington for Canvas covering the Building	122	0	0			
Paid Beesley and Co. for Carriage of Canvas, &c.	12	0	7			
Paid for Printing Tickets, &c.	14	1	6			
Incidental Expences	21	12	0			
				817	16	1
Expences of the Judges.						
By Amount paid to thirteen of the Judges for their Expences (the eighteen other Judges having made no claim)				140	14	11
Cattle-Yard.						
By paid to Wyatt and Vaughan for Enclosing the Yard, and Beer for the Men	158	13	6			
Paid to Mr. Redhead for Erecting the Pens and other Carpenters' Work, and Beer for the Men	314	0	0			
Paid to Mr. J. Pinfold for Compensation for the Use of the Yard, Forage, &c.	102	17	7			
Sundry incidental Charges	59	0	0			
				634	11	1
By Printing and Advertisements				49	0	5
Incidental Charges				138	11	3
				£2688	3	9

This Account examined by

D. BARCLAY.
C. B. CHALLONER.
THOMAS RAYMOND BARKER.

London, 4th December, 1839.

LIST OF GOVERNORS.

[Life-Governors are distinguished by a mark thus †.]

Governors.	Town Residence.	Country Residence.
Abingdon, Earl of	Clarendon Hotel	Wytham Abbey, near Oxford
†Acland, Sir T. D. Bt., M.P., F.R.S.	10, Upp. Harley-st.	Killerton Park, Collumpton. Devon.
Adeane, Henry John . . .	. .	Babraham House, Cambridge
Alston, Rowland, M.P. . .	48, Harley-street .	Pishiobury, Sawbridgeworth, Herts.
Alston, R. Gardiner . . .	48, Harley-street .	Pishiobury, Sawbridgeworth, Herts.
Amherst, Earl	66, Grosvenor-st. .	Montreal, Seven Oaks, Kent.
†Angerstein, John	23, St. James's-sq.	Weeting Hall, Brandon Ferry, Norfolk
Antrobus, Sir Edmund, Bart..	146, Piccadilly . .	Amesbury Abbey, Salisbury, Wilts.
†Arcedeckne, Andrew . . .	1, Grosvenor-sq .	Glevering Hall, Wickham Market, Suffk.
†Astley, Sir Jacob Henry, Bart.	7, Cavendish-sq.	Melton Park, East Dereham, Norfolk
†Aylesford, Earl of	50, Grosvenor-st.	Parkington Hall, Coventry, Warwicksh.
Bagge, William, M.P. . .	Carlton-club . .	Stradset Hall, Downham Market, Norfk.
Baker, Thos. John Lloyd . .	. .	Hardwicke Court, Gloucester
†Barclay, Charles	43, Grosvenor-pl. .	Bury Hill, Dorking, Surrey
†Barclay, David	8, Belgrave-square	Eastwick Park, Leatherhead, Surrey
†Baring, Hon. William B., M.P.	12, Gt. Stanhope-st.	
Baring, Sir Thomas, Bart. .	21, Devonshire-pl.	Stratton Park, Winchester, Hants.
†Barker, John Raymond . .	. .	Fairford Park, Fairford, Glouc.
Barker, Thomas Raymond .	. .	Hambleden, Henley-on-Thames, Oxon.
†Barneby, John, M.P. . . .	34, Portman-sq.	Brockhampton House, Bromyard, Heref.
Bassett, John	12, Upp. Brook-st.	
†Beach, William		
Beaufort, Duke of	22, Arlington-st.	Badminton, Chippenham, Glouc.
Benett, John, M.P. . . .	Limmer's Hotel	Pyt House, Hindon, Wilts.
Berens, Richard	19, Queen-st. M.Fr.	Sidcup, Foot's Cray, Essex
Bevell, J.		
Bisshopp, James	. .	Westburton, near Petworth, Sussex
Blachford, Fitz Roy . . .	. .	Osborn, Cowes, Isle of Wight, Hants.
Blake, William, F.R.S. . .	62, Portland-place	Danesbury, Welwyn, near Hertford
†Blanshard, Henry . . .	37, Gt. Ormond-st.	Kirby-in-le-Soken, Manningtree, Essex
Blount, William	12, Cumberland-st.	
Bonsor, Joseph	. .	Polesden, Great Bockham, Surrey
Boucher, John George . .	. .	Shadfield, near Wickham, Hants.
†Bowes, John, M.P.	26, Charles-street .	Streatham Castle, Staindrop, Durham
Bowles, J. S.	. .	Milton Hill, Abingdon, Berks.
Bramston, Thomas Wm., M.P.	11, Hereford-street	Skreens, Chelmsford, Essex
Braybrooke, Lord	10, NwBurlingtn-st	Audley-End, Saffron Walden, Essex
Bridport, Lord	12, Wimpole-st. .	Cricket Lodge, Chard, Somersetshire
Bridges, Sir Brook Wm., Bart.	. .	Goodnestone Park, nr. Wingham, Kent
Bruges, Wm. Heald L., M.P.	3, Suffolk-street. .	Seend Lodge, Melksham, Wilts.
Buckingham, Duke of . . .	Pall Mall . . .	Stowe Park, near Buckingham
†Buller, Edward, M.P. . . .	5, Suffolk-place . .	Dilhorne Hall, Cheadle, Staffs.
Buller, T. Wentw. Capt. R.N.	37, Bryanston-sq	
Bulteel, John C.	9, Grafton-street .	Fleet House, Yealmpton, Devon.
†Bunbury, Sir Henry Ed., Bart.	. .	Barton Hall, Bury St. Edmund's, Suffk.
Burdett, Sir F., Bart., M.P. .	25, St. James's-pl.	Foremark, near Derby

Governors.	Town Residence.	Country Residence.
Burlington, Earl of, F.R.S. .	10, Belgrave-square	Holker Hall, Milnthorpe, Westmoreland
Burrell, Sir C. M., Bart., M.P.	5, Richmond-ter. .	Knep Castle, Horsham, Sussex
†Cambridge, His Royal Highness The Duke of . . .	Cambridge-House, Piccadilly	Kew Palace, Surrey
†Cavendish, Hon. C. C., M.P. .	Burlington-ho., do.	Latimers, Chesham, Bucks.
Cayley, Sir George, Bart. . .	48, Albemarle-st.	High Hall, Brompton, Pickering, Yorks.
Challoner, Colonel C. Bisse .	29, Portman-square	Portnall Park, Virginia Water, Surrey
Chichester, Earl of . . .	17, Stratton-street.	Stanmer Park, Lewes, Sussex
Chichester, Sir Arthur, Bart.	. .	Youlstone, Barnstable, Devon.
†Childers, Jno. Walbanke, M.P.	Carlton Hotel .	Cantley Hall, Doncaster, Yorkshire
†Christopher, Robt. Adam, M.P.	97, Eaton-place	Bloxholme Hall, Sleaford, Linc.
Clifford, Hon. Charles Thomas	74, Gloucester-pl.	Irnham Hall, Coltersworth, Linc.
Clive, Lt.-Col. Ed. Bolton, M.P.	18, Grafton-st. .	Whitfield House, near Hereford
†Clive, Hon. Robt. Henry, M.P.	53, LwGrosvenor-st	Oakley Park, Ludlow, Salop.
Cook, William	22, St. Paul'sCh.-yd	Clapham Rise, Surrey
†Copeland, Alderman, M.P. .	37, Linc.-inn-fields	The Poplars, Leyton, Essex
Cotes, John	. .	Woodcote, Shiffnal, Salop.
Crawley, Samuel, M.P. . .	59, Portland-place	Stockwood House, Luton, Beds.
Crompton, Sir S., Bart., M.P.	20, Suffolk-street	Woodend, Thirsk, Yorkshire
Crowdy, James	. .	Highworth, Wilts.
Curteis, Edward Barrett . .	. .	Windmill Hill, Rye, Sussex
Curtis, W.		
Dacre, Lord	2, Chesterfield-st.	The Hoo, near Welwyn, Herts.
†Davenport, E. D.	. .	Calveley, Tarporley, Cheshire
De Beauvoir, R. B. . . .	34, Grosvenor-sq. .	Englefield House, Reading, Berks.
Denison, Wm. Joseph, M.P. .	90, Pall-mall . .	Denbies, Dorking, Surrey
Denison, John Evelyn . . .	. .	Ossington, near Tuxford, Notts.
Dickinson, Francis Henry .	8, Upp. Harley-st.	King Weston, near Somerton, Somerset.
Downshire, Marquess of . .	21, Hanover-sq. .	East Hampstead Park, Bracknell, Berks
Drummond, George . . .	11, Wilton-crescent	
Drummond, A. M. . . .	Charing Cross .	Tile House, Denham, Bucks.
Drummond, Charles . . .	Charing Cross .	Bower Hall, Haver Hill, Suffolk
Duffield, Thomas, M.P. . .	University Club	Marcham Park, Abingdon, Berks.
Dugdale, Wm. Stratford, M.P.	50, Berkeley-sq.	Blythe Hall, Coleshill, Warwickshire
Duncannon, Viscount . . .	3, Cavendish-sq.	Roehampton, Surrey
Duncombe, Hon. Wm., M.P. .	23, Cavendish-sq.	Hooton Pagnell, Doncaster, Yorks.
†Durham, Earl of	13, Cleveland-row	Lambton Castle, Durham
Ebrington, Viscount, F.R.S. .	. .	Phœnix Park, Dublin
†Egerton, T. Wilbraham . .	7, St. James's-sq. .	Tatton Park, Knutsford, Cheshire
Eliot, Lord, M.P.	47, Dover-street .	Port Eliot, St. Germains, Cornwall
Essex, Earl of	9, Belgrave-square	Cassiobury Park, Watford, Herts.
Estcourt, Thos. H. S. B., M.P.	58, LwGrosvenor-st	New Park, Devizes, Wilts.
Estcourt, T. G. B., M.P. . .	41, Dover-street	Estcourt, Tetbury, Glouc.
†Etwall, Ralph, M.P. . . .	Oxf. & Camb. Club	Andover, Hants.
Euston, Earl of, M.P. . . .	7, Grosvenor-place	Salcey Forest, Northampton
Evans, William, M.P. . .	8, Knightsbrdg-ter.	Allestree Hall, near Derby
†Exeter, Marquess of . . .	7, Albemarle-st.	Burghley House, Stamford, Linc.
†Eyre, Charles	. .	Welford, near Newbury, Berks.
Falmouth, Earl of	2, St. James's-sq.	Tregothnan, Truro, Cornwall
Farquharson, J. J. . . .	. .	Langton, Blandford, Dorset.
Fawkes, T. Hawkesworth .	. .	Farnley Hall, Otley, Yorkshire
Fellowes, Edward, M.P. . .	15, LwrBerkeley-st	Ramsey Abbey, Huntingdon.
†Fitzwilliam, Earl, F.R.S. . .	Mortimer House	Milton, Peterborough, Northampton.
Flounders, Benjamin . . .	. .	Yarm, Yorkshire
Foley, J. H. Hodgetts . .	. .	Prestwood, near Stourbridge, Worc.
Freeman, W. Peere Williams.	. .	Fawley Court, Henley-on-Thames, Oxon.

Governors.	Town Residence.	Country Residence.
Gibbs, Humphrey	24, Half Moon-st.	Ampthill, Beds.
Gillies, Robert Maule . . .	Corn Exchange	
Gooch, Sir Thomas S., Bart. .	. .	Benacre Hall, Wrentham, Suffolk
Gordon, Robert, M.P. . . .	29, Dover-street .	Kemble Ho., near Cirencester, Glouc.
Grafton, Duke of	47, Clarges-street .	Euston Hall, Thetford, Norfolk
†Graham, Rt.Hon.SirJ.,Bt.FRS	46, Grosvenor-pl. .	Netherby, by Carlisle, Cumberland
Greathead, Edward . . .	8, Hind-st, Man.sq.	Uddings, nr. Ringwood, Hants.
Guest,SirJ.J., Bt., M.P.,F.R.S.	13, Grosvenor-sq. .	Dowlais Ho., Merthyr-Tydvil, Glamrg.
Guise, Sir John W., Bart. .	. .	Rendcombe Park, Cirencester, Glouc.
Hale, Robert Blagden, M.P. .	15, Bolton-st. . .	Alderley Pk., nr Wootton, Tetbury, Gl.
†Handley, Henry, M.P. . .	30, Pall Mall . .	Culverthorpe Hall, Sleaford, Lincolnsh.
Handley, W. F.	. .	Newark-upon-Trent, Notts.
†Harcourt, George Simon, M.P.	Carlton Club . .	Ankerwycke House, Staines, Bucks.
Harland, Wm. Charles, M.P.	3, Chesterfield-st.	Sutton Hall, Easingwold, Yorks.
Hartopp, Sir Edmd. C., Bart.	169, New Bond-st.	Doe Bank, Sutton Colefield, Warw.
Hatherton, Lord	45, Grosvenor-pl. .	Teddesley Hall, Penkridge, Staffs.
Hayter, W. Goodenough, M.P.	11, Hyde Park ter.	Stoberry Park, Wells, Somerset.
Heathcoat, John, M.P. . .	6, Suffolk-street .	Bolham, Tiverton, Devon.
Heathcote, Gilbert J., M.P. .	Burlington Hotel	Stocken Hall, Grantham, Linc.
Heathcote, Sir W., Bart., M.P.	26, St. James's st.	Hursley Park, Winchester, Hants.
†Heneage, George Fieschi .	. .	Hainton Hall, Wragby, Linc.
†Herbert, Hon. Sydney, M.P. .	1, Grafton-street .	Wilton House, Salisbury
Hervey, William	. .	Bradwell Grove, Burford, Oxon.
Hewett, W. H.		
†Hill, Sir Rowland Bart., M.P.	Limmer's Hotel .	Hawkstone Hall, Whitchurch, Salop.
Hippisley, Henry	. .	Lambourne Place, nr. Hungerford, Berks.
Hodges, Thomas Law, M.P. .	16, Suffolk-street .	Hempsted Park, Benenden, Kent
†Holford, R. S.	43, Grosvenor-sq.	Weston Birt House, Tetbury, Glouc.
Holland, Edward	. .	Dumbleton Hall, Evesham, Worc.
Hope, Henry Thomas, M.P. .	1, Mansfield-st. .	The Deepdene, Dorking, Surrey.
Houblon, John Archer . .	10, Cumberland-pl.	Hallingbury Pl, Bishop Stortford, Herts
†Howick, Viscount, M.P. . .	16, Whitehall-place	Howick House, Alnwick, Northumb.
Hulse, Sir Charles, Bart . .	. .	Breamore Ho., Fordingbridge, Hants.
†Hulse, Lieut.-Colonel . . .	. .	Breamore Ho., Fordingbridge, Hants.
Huntingfield, Lord . . .	. .	Heaveningham Hall, Yoxford, Suff.
†Huntingtower, Lord . . .	. .	Buckminster Park, Colsterworth, Linc.
Hurst, Robert Henry, M.P. .	68, St. James's-st.	Horsham, Sussex
Hyett, W. H.	. .	Painswick House, Stroud, Glouc.
†Ilchester, Earl of	31, Old Burlngtn-st	Melbury House, Sherborne, Dorset.
Johnstone, Sir John V. B., Bt.	27, Grosvenor-sq.	Hackness Hall, Scarborough, Yorkshire
Jones, Rev. J. P.	. .	Elm Green, Cirencester, Glouc.
Keene, Rev. Chas. Edmund .	. .	Swincombe House, Nettlebed, Oxon.
Kensington, Lord	2, Carlton Ho. ter.	
†Kerrison, Lt.Gen.SirE.,Bt.M.P.	13, Gt. Stanhope-st.	Oakley Park, Eye, Suffolk
Kenyon, Lord	9, Portman-square	Gredington Hall, Whitchurch, Flints.
Knatchbull,R.Hn.SirE,Bt. MP	71, Lower Grosv.-st.	Mersham Hatch, Ashford, Kent
Labouchere, Rt. Hon. H., M.P.	27, Belgrave-sq. .	Stowey, Somersetshire
Lainson, Alderman John . .	59, Euston-square	
Langston, J. Haughton . .	143, Piccadilly .	Sarsden Ho., Chipping Norton, Oxon.
Lansdowne, Marquess of, F.R.S.	Berkeley-square .	Bowood Park, Calne, Wilts.
†Lawley, Sir Francis, Bart. .	18, Grosvenor-sq. .	Middleton Hall, Fazeley, Staffs.
†Lefevre, Rt.Hon.C. Shaw, MP.	Eaton-square . .	Heckfield Pl., Hartford Bridge, Hants.
Leigh, Lord	7, Park-crescent .	Stoneleigh Abbey, Kenilworth, Warw.
Lemon, Sir C., Bt. MP., F.R.S.	. .	Carclew, Penryn, Cornwall
Ley, John Henry	4, Richmond-ter.	Trehill, Exeter

Governors.	Town Residence.	Country Residence.
Liverpool, Earl of	Whitehall	Pitchford Hall, Shrewsbury, Salop
†Long, Walter, M.P.	29, Hill-street	Rood Ashton, Trowbridge, Wilts.
Lovelace, Earl of	10, St. James's-sq.	Ockham Park, Ripley, Surrey
Low, William	6, Norfolk-st, Strnd	
Macclesfield, Earl of, F.R.S.	9, Conduit-street	Sherborne Castle, Tetsworth, Oxon.
Maitland, Eben. Fuller, F.R.S.	3, Bryanstone-sq.	Henley-on-Thames, Oxon.
Maitland, Wm. Whitaker	. .	Loughton, Essex
Mason, W. W.	. .	Linton, Cambridgeshire
Maclean, Donald, M.P.	24, Berkeley-sq.	King's Stanley Ho, Frocester, Dursley, Gl.
Melbourne, Viscount	39, South-street	Brocket Hall, Welwyn, Herts.
†Miles, Philip J.	7, Hamilton-place	Leigh Court, Bristol
†Miles, William, M.P.	Ditto	King's Weston, Bristol
†Mordaunt, Sir J., Bart., M.P.	4, Eaton-place	Walton Hall, Stratford-on-Avon, Warw.
†Moreton, Lord	2, Seymour-place	Woodchester Park, Stroud, Glouc.
Morgan, Sir Chas. Gould, Bart.	70, Pall Mall	Tredegar, Newport, Monmouthshire
Morland, Thomas Thornhill	102, Gloucester-pl.	Sheepstead, Abingdon, Berks.
†Morrison, James	57, Upp. Harley-st.	Fonthill Abbey, Hindon, Wilts.
Morton, John	. .	Chester Hill, Stroud, Glouc.
Moseley, John	. .	Glemham Ho., Saxmundham, Suffolk
Mostyn, Lord	9, Lwr Seymour-st.	Mostyn Hall, Holywell, Flintshire
Mostyn, Hon. Ed. M. Lloyd	9, Gt. Seymour-st.	Mostyn Hall, Holywell, Flintshire
Naper, James Lennox Wm.	. .	Lough Crew, Oldcastle, Ireland
†Neeld, Joseph, M.P.	6, Grosvenor-sq.	Grittleton House, Chippenham, Wilts.
Noel, Hon. Charles George	11, Chandos-st, Cav.	Exton Park, Stamford, Linc.
Norfolk, Duke of, F.R.S.	21, St. James's-sq.	Arundel Castle, Sussex
Normanby, Marquess of	Whitehall	Mulgrave Castle, Whitby, Yorkshire
Northampton, Marq. of, P.R.S.	145, Piccadilly	Castle Ashby, Northampton
†Northumberland, Duke of, FRS.	Northumberlnd-ho	Alnwick Castle, Northumberland
Nurse, Wm. Mountford	5, Langham-pl.	Great Cell Barns, St. Albans
Page, William Woods	17, Wimpole-st.	
Palmer, Robert, M.P.	6, Charles-street.	Holme Park, Reading, Berks.
Patten, John Wilson, M.P.	24, Hill-street.	Bank Hall, Warrington, Lanc.
†Peel, Rt. Hon. Sir R., Bt., F.R.S.	Whitehall Gardens	Drayton Manor House, Fazeley, Staffs.
Pegus, Rev. P. M.	. .	Uffington Hall, Stamford, Lincl.
†Pendarves, E. W., M.P., F.R.S.	36, Eaton-place	Pendarves House, Truro, Cornwall
Penruddocke, Jno. Hungerford	35, Curzon-street	Compton Park, Salisbury, Wilts.
†Percival, John	. .	Northampton
Philips, Mark, M.P.	6, Vigo-street	The Park, Manchester
Plowden, William	. .	Plowden Castle, Ludlow, Salop.
†Popham, General	. .	Littlecot, Hungerford, Wilts.
†Portman, Lord	18, Eaton-square	Bryanston House, Blandford, Dorset.
Price, Sir Robert, Bart., M.P.	11, Stratton-street	Foxley Hall, near Hereford
†Pusey, Philip, M.P., F.R.S.	35, Grosvenor-sq.	Pusey, Faringdon, Berkshire
Pym, Francis	35, Clarges-street	The Hasells, Biggleswade, Beds.
†Radnor, Earl of	52, Lwr Grosvr-st.	Longford Castle, Salisbury, Wilts.
Rayleigh, Lord		Terling Place, Witham, Essex
†Richmond, Duke of	51, Portland-place	Goodwood Park, Chichester, Sussex
Ripon, Earl of, F.R.S.	1, Carlton Gardens	Nocton Hall, Lincoln
Rodd, Rev. Edward, D.D.	. .	Trebartha Hall, Launceston, Cornwall
Rogerson, Joseph		
Rosebery, Earl of, F.R.S.	139, Piccadilly	Warren Wood, Hatfield, Hertfordshire
†Rutland, Duke of	7, Bolton-street	Belvoir Castle, Grantham, Leicestershire
Salisbury, Marquess of	20, Arlington-st.	Hatfield House, Herts.
†Sanford, Ed. A., M.P., F.R.S.	21, Queen-st, Mayfr	Nynehead Court, Wellington, Somerset.
Scarborough, Earl of	41, South-st.	Sandbeck Castle, Bawtry, Yorkshire

Governors.	Town Residence.	Country Residence.
Seymour, Henry	39, Upp. Grosvr.-st	Knoyle House, Hindon, Wilts.
Shaw, William	7, King's-rd, Bdf-rw	
Sheffield, Earl of	20, Portland-place	Sheffield Park, Uckfield, Sussex
Sherborne, Lord	17, Hyde Park-st.	Sherborne House, Northleach, Glouc.
Sheridan, Richard Brinsley .	9, Grosvenor-sq. .	Frampton House, Dorchester, Dorset.
Shuckburgh, Sir F., Bart. FRS.	Hans-pl., Chelsea	Shuckburgh Park, Southam, Warwicksh.
†Slaney, Robt. Aglionby, M.P..	17, Suffolk-street	Walford Manor, Shrewsbury, Salop.
Smith, Jeremiah	. .	Cadbar, Rye, Sussex
†Smith, John Abel, M.P. . .	47, Belgrave-sq.	Sacombe Park, Ware, Herts.
Smith, William	. .	Prae Mill, St. Albans, Herts
†Sondes, Lord	17, St. James's-pl.	Rockingham Castle, Northamptonshire
†Spencer, Earl	27, St. James's-pl.	Althorp Park, near Northampton
Stanhope, John Spencer . .	. .	Cannon Hall, Barnsley, Yorkshire
†Stanley, Lord, M.P. . . .	8, St. James's-sq. .	Knowsley Hall, Prescot, Lancashire
Stansfield, Wm. R. C., M.P.	11, Clarges-street .	Esholt Hall, Bradford, Yorkshire
Stonor, Lord	3, Tilney-street .	Stonor Park, Henley-on-Thames, Oxon.
Stracey, Sir Edw. Bart., F.R.S.	. .	Rackheath Hall, Norwich
†Stradbroke, Earl of . . .	18, Queen-street .	Henham Park, Wangford, Suffolk
†Strutt, Edward, M.P.	42, South-street .	St. Helen's, near Derby
Stuckey, Vincent	126, Sloane-street	Hill House, Langport, Somersetshire
†Sutherland, Duke of . . .	Stafford House .	Trentham Park, Newcastle-under-Lyne
†Sutton, Sir Richard, Bart. .	. .	Norwood Park, Southwell, Notts.
†Talbot, Earl, F.R.S.	33, Gt. George-st.	Ingestre Hall, near Stafford
Thomas, Inigo	. .	Ratton Park, Eastbourne, Sussex
Thorald, Sir John Chas., Bart.	. .	Syston Park, Grantham, Lincolnshire
Tower, Christopher Thomas .	. .	Weald Hall, Brentwood, Essex
†Townley, Rich. Greaves, M.P.	Limmer's Hotel .	Fulbourn House, near Cambridge
Tremayne, John Hearle . .	. .	Heligan, Grampound, Cornwall
Trotter, John	. .	Horton Place, near Epsom, Surrey
Vansittart, Henry	. .	Kirkleatham, Guisborough, Yorkshire
Vavasour, Hon. Sir E. M., Bart.	. .	Haslewood Hall, Tadcaster, Yorkshire
Villebois, F.	. .	Adderbury Lodge, Kingsclere, Hants.
†Wakeman, Sir Offley P., Bart.	3, Princ.-st, Han-sq	Perdiswell Park, Worcester
Wall, Ch. Baring, M.P., F.R.S.	44, Berkeley-sq. .	Normanton Court, Stockbridge, Hants.
Watson, Hon. Richard . .	36, Davies-street .	Rockingham Castle, Northampton.
Welby, Sir Wm. Earle, Bart.	8, Upp. Belgrave-st.	Denton House, Grantham, Lincolnshire
†Wellington, Duke of . . .	Apsley House . .	Strathfieldsaye, Hartford-bridge, Hants
†Wenlock, Lord	29, Berkeley-sq. .	Escrick Hall, Selby, Yorkshire
†Westminster, Marquess of .	33, Upp. Grosv.-st.	Eaton Hall, Chester
†Whitbread, William Henry .	76, Eaton-square .	South Hill House, near Bedford
Wilbraham, G., M.P., F.R.S.	23, Brook-street .	Delamere House, Northwich, Cheshire
Williams, William, M.P. . .	31, Pall-Mall	
Williams, Rev. E. H. G. . .	. .	Marlborough, Wilts.
Wilmot, Edward Woollet . .	. .	Worksop Manor, Nottinghamshire
Wills, Benjamin	. .	Camberwell, Surrey
†Wilson, Henry	. .	Stowlangtoft Hall, Suffolk
Wilshere, William, M.P. . .	2, I, Albany . .	Walsworth Hermitage, Hitchin, Herts.
Wingate, W. B.	.	Hareby, Bolingbroke, Lincolnshire
Wood, Col. Thomas, M.P. .	4, Cavendish-sq. .	Littleton House, Staines, Middlesex
†Worsley, Lord, M.P. . . .	12, Up. Belgrave-st.	Manby Hall, Glanford Bridge, Linc.
Wright, John	6, Henrietta-st. C G	Belsize Park, Hampstead, Middlesex
Wroughton, Bartholomew . .	. .	Woolley Park, Wantage, Berks.
†Yarborough, Earl of . . .	17, Arlington-st. .	Brocklesby Hall, Glanford Bridge, Linc.
Yorke, W.		
Youatt, William	. .	11, Adam's-terrace, Camden Town

LIST OF MEMBERS.

[LIFE-MEMBERS are distinguished by a mark thus †.]

Members.	Town Residence.	Country Residence.
Abbey, George	. .	Silsworth, Watford, Daventry, Northm.
Abbott, Thomas	. .	Aylesford, Kent
Ackland, Robert Fines	. .	Boulston, Haverford West, Pembroksh.
Acland, Thomas Dyke, M.P.	92, Jermyn-street	Holnicote, Minehead, Somersetshire
Acome, John	. .	Kidlington, Woodstock, Oxon.
Adcock, William	. .	Farmdish, nr. Wellingborough, Northn.
Ade, Rev. John	. .	Wensley Rectory, Bedale, Yorkshire
Adey, William	. .	Chorley, Lichfield, Staffs.
Agar, Hon. G. C.	. .	Woodstock, Oxon.
Aitken —	. .	Deeping Fen, Spalding, Lincolnshire
Albright, Nicholas	. .	Charlobury, Enstone, Oxon.
Alderman, Charles	. .	Kentbury, Newbury, Berks.
Aldridge, Robert	. .	St. Leonard's Forest, Horsham, Sussex
Aldworth, J.	. .	Frilford, Abingdon, Berks.
Aldworth, W., Jun.	. .	Frilford, Abingdon, Berks.
Alexander, Wm. Maxwell	22, Upp. Grosv.-st.	Southbar, Renfrewshire
Allen, John	. .	Liskeard, Cornwall
Allen, W.	. .	Great Hendred, Wantage, Berks.
Allin, Richard	. .	Little Moor, Oxford
Allin, Richard, Jun.	. .	Sandford, Oxford
Allix, Charles	. .	Willoughby, Alford, Lincolnshire
Allpress, R. W.	. .	Burleigh Hill, St. Ives, Hunts.
Almack, John, Jun.	. .	Leckonfield Park, Beverley, Yorkshire
Almack, Thomas	. .	Bishop Burton, Beverley
Almack, Barugh	10, Whitehall-pl.	
Alywin, William	. .	Thatcham, Newbury, Berks.
Ambrose, ——		
Anderson, Robert	. .	Cirencester, Gloucestershire
Anderson, William	. .	Oakley, Bedford
Andrews, Benjamin	. .	Chartham, Canterbury, Kent
Andrews, Edwin	. .	Shroton, Blandford, Dorsetshire
Annesley, Arthur	89, Eaton-square	Bletchington Park, Woodstock, Oxon.
Annesley, Rev. Charles	. .	Eydon, near Daventry, Northamp.
Ansell, William	. .	Wantage, Berks.
Arbuthnot, Rt. Hon. Charles	. .	Woodford Lodge, Thrapston, Northamp.
†Archbold, Robert, M.P.	55, Jermyn-street	David's Town, Castledermot, Ireland
Archer, William	. .	Horningsham, Warminster, Wilts.
Arkwright, Charles	. .	Dunstall Lodge, Burton-on-Trent, Staff.
Arkwright, Rev. Joseph	. .	Mark Hall, Harlow, Essex
Arnatt, Jonathan	. .	Leer, Witney, Oxon.
Arnitt, G.		
Arnot, David Gale	. .	Wyfold Court, Henley-upon-Thames
Arnott, George	. .	Tingewick, Buckingham
Ashdown, John M.	. .	Uppington, Shrewsbury, Salop.
Ashhurst, William Henry	. .	Waterstock House, Wheatley, Oxon.
Ashhurst, W. H., Jun.	. .	Waterstock House, Wheatley, Oxon.
†Astbury, William	62, High-st, Cam.T	

Members.	Town Residence.	Country Residence.
Aston, Samuel	. .	Compton House, Newcut, Gloucester
Atkins, E. Martin	. .	Kingston-Lisle, Wantage, Berks.
†Atkinson, William James .	. .	Marlow, Buckinghamshire
Atterbury, H. S.	. .	Woburn, Bedfordshire
Austen, Colonel	. .	Seven Oaks, Kent
Austin, L. S.	. .	The Warren, Wootton-under-Edge
Aylmer, Robert	. .	Fincham Hall, Fincham, Norfolk
Bacon, James	. .	Pluckley, Charing, Kent
Badcock, Benjamin	. .	Broad-street, Oxford
Badcock, John.	. .	Radley, Abingdon, Berks.
Baden, Andrew	. .	Long street, Pewsey, Wilts.
Badham, G. D.	. .	Waldringfield, Woodbridge, Suffolk
Bailey, Charles	. .	Abingdon, Berks.
Bailey, William James . .	. .	Shenley House, Stony Stratford, Bucks
Bailey, J.	. .	Shirley House, Stony Stratford, Bucks
Bailey, William	. .	Hursley, Winchester, Hants.
Baillie, W. H.	33, Cavendish-sq.	Duntisbourne, Cirencester, Gloucestersh.
Bailward, John	. .	Horsington, Wincanton, Somersetshire
Baines, John	8, Cleveland-row .	Goosnargh, Preston, Lancashire
Baines, John Fuller . . .	. .	Stisted, near Braintree, Essex
Baker, Robert	. .	Writtle, Chelmsford, Essex
Baker, Richard W.	. .	Cottesmore, Oakham, Rutlandshire
Baker, Sir Edw. Baker, Bart.	. .	Ranston House, Blandford, Dorset.
Baker, T. Barwick . . .	. .	Hardwick Court, Gloucester
Baker, Rev. Richard Henry .	. .	Linchmere, Hazlemere, Sussex
Baker, Thomas	. .	Little-Rollright, Chipping-Norton, Oxon
Baldwyn, Stephen	. .	Ashton-Underhill, Gloucestershire
Ballard, Rev. J.	. .	Cropredy, Banbury, Oxon.
Bannerman, A.	. .	Chorley, Lancaster
Banting, James	. .	Oxford
Barber, Richard	. .	Charlton, Tetbury, Gloucestershire
Barclay, William	. .	Haseley, near Warwick
Barclay, J. P.	. .	Wickham Market, East Suffolk
Barker, Field Dunn . . .	. .	Cambridge
Barker, George Raymond . .	. .	Fairford Park, Fairford, Gloucestersh.
Barlow, Rev. G. F.	. .	Burgh, Woodbridge, Suffolk
Barnard, Edward George, M.P.	. .	Gosfield Hall, Essex
Barnard, F.	. .	Wantage, Berks.
Barnard, Richard	. .	Pusey, near Faringdon, Berks.
†Barneby, William	. .	Chater Park, Bromyard, Herefordshire
Barnett, Charles	. .	Stratton Park, Biggleswade, Beds.
Barnett, Joseph	. .	Remenham Hill, Henley-on-Thames
Barrett, Thomas	. .	Tatsfield Court, Westerham, Kent
Barrington, Viscount, M. P. .	34, South-street .	Beckett House, Faringdon, Berks.
Barter, Rev. C.	. .	Sarsden, Chipping-Norton, Oxon.
Barthropp, Nathaniel . . .	. .	Cretingham, nr. Framlingham, Suffolk.
Bartlett, William	. .	Whatcombe, Blandford, Dorset.
Bartlett, Isaac	. .	Haws, Brackley, Northamptonshire
Bartlett, John	. .	Haws, Brackley, Northamptonshire
Barton, Thomas	. .	Threxton, Watton, Norfolk
Barton, John	. .	Lee, Havant, Hampshire
Barton, Nathaniel	. .	Corsley House, Warminster, Wilts.
Barugh, William	. .	Beeford, Bridlington, Yorkshire
Bateman, Henry	. .	Rickmansworth, Herts.
Bateman, Thomas, M.A. . .	6, Raym.bds. G.In.	Guilsborough, Northamptonshire
Bates, Thomas	. .	Kirkleavington, Yarm, Yorks.
Bates, Thomas Ellis . . .	. .	Fittleton, Amesbury, Wilts.
Bathurst, Earl	8, John-st, Berk.-sq	Oakley Park, Cirencester, Glouc.

Members.	Town Residence.	Country Residence.
Bathurst, Hon. William L.	7, Half-moon-st.	
Batley, John		
Batt, E. A.		Witney, Oxfordshire
Bawldry, Charles		Hasketon, Woodbridge, Suffolk
Bawtree, John		Sayer, Colchester, Essex
Baxter, Robert		Doncaster, Yorkshire
Bayley, C. B.		
Bayne, William		Oxford
Beach, Sir Mich. Hicks, Bart.	20, Portman-sq.	Williamstrip Park, Fairford, Gloucest.
Beach, John		Redmarley, Stroud, Gloucester.
Beadel, James		Witham, Essex
Beales, Charles		Shelford, Cambridgeshire
Beales, Patrick		Cambridge
Beard, Rev. James		Cranfield, Woburn, Bedfordshire
Beasley, John		Brampton, Northamptonshire
Beasley, T. Calvert		Harston, Grantham, Lincolnshire
Beaufort, Henry		Holme, Biggleswade, Bedfordshire
Beaumont, E. B.		Firmingley, Bawtry, Nottinghamshire
Beck, William		Mileham, East Dereham, Norfolk
Beck, Edward		Harpley, Castle Rising, Norfolk
Beckett, W.		Kirkstall Grange, Leeds, Yorkshire
Beckford, William	36, Finsbury circus	
Bedford, John		Boughton House, Lincolnshire
Beldam, Valentine		Royston, Hertfordshire
Beman, Robert		Donnington, Moreton-in-Marsh, Glouc.
Bennett, James		Cadbury House, Castle Carey, Somers.
Bennett, Joseph		Tempsford, Biggleswade, Beds.
Bennett, Samuel		Bickerings Park, Woburn, Beds.
Bennett, Thomas		Woburn, Beds.
Bennett, Thomas		Chaddlesworth, Wantage, Berks.
Bennett, William		Lewsey, near Luton, Beds.
Bennett, W.		Syde, Cirencester, Gloucestershire
†Benson, Rev. Henry B.		Utterby House, Louth, Lincoln.
Benson, John		Tavistock, Devon.
Bentley, Thomas		Hermitage, Rochester, Kent
Best, Rev. T.		Kirby-on-Bain, Horncastle, Lincoln.
Bethell, Henry		Enford, Pewsey, Wilts.
Bethune, Edward Drinkwater	80, Chester-square	
Bethune, Rev. G.		Worth Rectory, Crawley, Cuckfield, Sus.
Bethune, John Drinkwater		Thorncroft, Leatherhead, Surrey
Bettridge, Henry		East Hanney, Abingdon, Berks.
Bettridge, R. H.		Milton Hill, Abingdon, Berks.
Betts, William		Church Farm, Stow Bardolph, Norfolk
Bicheno, Jas. Ebenezer, F.R.S.		Ty-Maen, Pyle, Glamorganshire
Bigg, Thomas	15, Crawford - st.	
Binns, Jonathan		
Birch, George W.		Roxholme, near Sleaford, Lincolnshire
Bird, John		Shouldham Abbey, Shouldham, Norfolk
Birks, John		Herringfield
Birnie, John Richard	8, St. Martin's-pl.	Euston Farm, near Bagshot
Birt, Jacob	12, Myddleton-sq.	
Bisshopp, John		Westburton, Petworth, Sussex
Blackbourn, David		Temple Brewer, Lincolnshire
Blackett, Henry		Stockburn, Darlington, Durham
Blackford, Richard		Malmesbury, Wilts.
Blagrove, Edward		Magdalen College, Oxford
†Blair, John	18, Calthorpe - st.	Moseley Lodge, Welford
Blake, Nathaniel		Stanton-Harcourt, Ensham, Oxon.
Blakesley, Rev. Jos. W., M.A.		Trinity College, Cambridge
Blanch, Gustavus William	Storey's Gate	

Members.	Town Residence.	Country Residence.
Bland, Thomas, M.D.	. .	Melton, Woodbridge, Suffolk
Bland, William	. .	Hartlip, Sittingbourne, Kent
Blandy, Adam	. .	Kingston House, Abingdon, Berks.
Blandy, T.	. .	Kingston, Bagpuze, Abingdon, Berks.
Blandford, Marquess of	5, York-st. St. Jas.	Howbury, Beds.
Blexam, W.	. .	Moditonham, Devonport
†Bliss, Rev. Philip, D.D.	. .	Oxford
Blunt, Edward Walter	. .	Kempshott, Park, Basingstoke, Hants.
Blurton, William	. .	Field Hall, Uttoxeter, Staffordshire
Blyth, H. E.	. .	Burnham-Westgate, Norfolk
Boards, William	. .	Edmonton, Middlesex
Boby, Charles	. .	Finborough, Stowmarket, Suffolk
Bodley, John	. .	Stockleigh, Crediton, Devon.
Bolton, Lord	25, Berkeley-sq.	Hackwood Park, Basingstoke, Hants.
Booth, John	. .	Killerby, Catterick, Yorkshire
Boringdon, Viscount	. .	Kent House, Knightsbridge, Middlesex
Bortlett, William	. .	Great Bedwin, Wiltshire
Bosanquet, G. J.	. .	Broxbournbury, Hoddesden, Herts.
†Botfield, Beriah	. .	Norton Hall, Daventry, Northamptonsh.
Botfield, Thomas	. .	Hopton Court, Cleobury-Mortimer, Salp.
Botfield, William	. .	Decken Hill, Shiffnal, Salop.
Botley, John	. .	Stockleigh, Crediton, Devon.
†Bourchier, Charles	66, Wimpole-street	
Bourne, George	. .	Halton, Spilsby, Lincolnshire
Bouverie, Edward	. .	Delapre Abbey, Northampton
Bowley, David	. .	Cirencester, Gloucestershire
Bowley, E.	. .	Cirencester, Gloucestershire
Bowley, William	. .	Cirencester, Gloucestershire
Bowman, C.		
Boys, Henry	. .	Waldersham, Dover, Kent
Boys, R.	. .	Eastbourne, Sussex
Boys, Edward	. .	Alkerton, Banbury, Oxon.
Brackenbury, John	. .	Thorpe Hall, Shouldham Thorpe, Norf.
Bradford, Edward	. .	Beaconsfield, Bucks.
Bradley, Edward	. .	Traduff, Cowbridge, Glamorganshire
Brailsford, Thomas	. .	Barkwith, Wragby, Lincolnshire
Braine, Robert	. .	Oxford
Braithwaite, Garnet	. .	Plumtree Hall, Milnthorpe, Westmorld.
Brenner, W.		
Bretingham, T. C.	. .	Brockdish, Harleston, Norfolk
Brettell, Richard	. .	Finstall, Bromsgrove, Worcestershire
Brewitt, Thomas	. .	Rayleigh, Essex
Breynton, John	. .	Haunch Hall, Lichfield, Staffordshire
Bridge, Thomas	. .	Buttsbury, Ingatestone, Essex
†Bright, J.	. .	Teddesley Pk. Farm, Penkridge, Staffs.
Bristow, S. E.	. .	Burthorp House, Newark, Notts.
Broadwood, J. S.	. .	Lyne, Dorking, Surrey
Brockman, Frederick	. .	Underhill, Hythe, Kent
Bromhead, Benjamin	. .	Lincoln
Bromley, R. Madox	Colonial Club	
Bromwell, Rev. R.	. .	Pembroke College, Oxford
†Brooke, Sir Richard, Bart.	. .	Norton Priory, Runcorn, Cheshire
Brookes, John	. .	Burton, Much-Wenlock, Salop
Brooks, John	. .	Hatford, Faringdon, Berkshire
Brooks, T.	. .	Croxby, Cambridgeshire
Brooks, Bernard	. .	Lyford, Wantage, Berkshire
Brown, Charles	. .	Redbourn, St. Alban's, Hertfordshire
Brown, Davies	. .	Markham Hall, Shouldham, Norfolk
Brown, Francis	. .	Welbourne, Sleaford, Lincolnshire
Brown, George	. .	Avebury, Marlborough, Wiltshire

Members.	Town Residence.	Country Residence.
Brown, George	. .	Avebury, Marlborough, Wiltshire
†Brown, Rev. H.	. .	Burton, Sleaford, Lincolnshire
Brown, J.	. .	Pamphill Ho., Wimborne Minster, Dors.
Brown, John	. .	Compton, Ibsley, Ringwood, Hants.
Brown, Joseph	. .	Church Farm, Wimbotsham, Norfolk
Brown, Rev. Robert	. .	Kidlington, Woodstock, Oxon.
Brown, T.		
Brown, Thomas	. .	Bartenbury Ho., Cirencester, Glouces.
Brown, Thomas	. .	South Fairly, Wantage, Berkshire
Brown, William	. .	Tring, Hertfordshire
Browne, John	11,O.Cavendish-st	Chisledon, Marlborough, Wiltshire
Browne, Rev. Robert		
Browne, W. R.	. .	Chisledon, Marlborough, Wiltshire
Browning, Jonathan	. .	Oxford
Brunner, William	. .	Oxford
Bryant, William	. .	Newmarket, Cambridgeshire
Bubb, Anthony	. .	Whitcombe, Gloucestershire
Buchan, James.	. .	Franch, near Kidderminster, Worcest.
Buci, Richard	. .	Bridge Place, Canterbury, Kent
Buckland, Rev.W.,D.D., F.R.S.	. .	Christchurch, Oxford
Buckley, John	. .	Normanton Hill, Loughborough, Leic.
Budd, Captain H., R. N.	. .	Winterbourne Basset, Marlbro', Wilts.
Bulford, Thomas	. .	Studley, Oxford
†Buller, John	. .	Morsal, Looe, Cornwall
†Bullock, Ferdinand	. .	East Challow, Wantage, Berkshire
Bulwer, William Lytton	. .	Heydon Hall, Aylsham, Norfolk
Bunnett, Thomas		
Burd, Timotheus	. .	Whiston Priory, Salop.
Burder, D.	. .	Abingdon, Berkshire
Burford, Thomas		
Burgess, Robert	. .	Winterborne Bassett, Blandford, Dors.
Burke, French	10,Gt.James-st,B.r	
Burn, Ilderton	21, Connaught-sq.	
Burnand, William	. .	Norton, Chichester, Sussex
Burness, C.	. .	Woburn Abbey, Bedfordshire
Burrows, T., Jun.	. .	Headdington, Oxford
Burt, Thomas	. .	Iwerne, Blandford, Dorsetshire
Burt, William	. .	Witchampton, Wimborne-minster, Dst.
Burt, A.	. .	Witchampton, Wimborne-minster, Dst.
Burt, George	. .	Witchbury, Wiltshire
Burton, Launcelot Archer	. .	Grove End House, St. John's Wood
Burtt, James	. .	Clenston
Bury, John W.	20,Devon.-st,Pt.-pl	
Bush, John	. .	Park Farm, Stow Bardolph, Norfolk
Butcher, W.	. .	Standish, Stroud, Gloucestershire
Butler, Thomas, jun.	. .	Hatfield-Peveril, Essex
Butterfield, Charles Cotton	. .	Petersfield, Hampshire
Butterfield, John	. .	Halse, Brackley, Northamptonshire
Cadle, Joseph	. .	Westbury-on-Severn, Gloucestershire
†Calcraft, John Hales, M.P.	12, Carlton-terrace	Corfe Castle, Dorset.
†Caldecott, Thomas	. .	Rugby Lodge, Rugby, Warwickshire
Caldecote, R. M.	. .	Eastbourne, Sussex
Caley, Digby	. .	Ripon, Yorkshire
Calhoun, Walter F.	. .	Binderton, near Chichester, Sussex
Callum, Joseph	. .	Pattingham, Wolverhampton, Staffs.
Calthorp, Richard	. .	Swinehead Abbey, Boston, Lincolnshire
Calverley, Thomas	1, Regent-street	Ewell House, Ewell, Surrey
Calvert, Edmund	. .	Hunsdon, Ware

Members.	Town Residence.	Country Residence.
Calvert, Colonel Felix	. .	Hunsdon House, Ware, Herts.
†Calvert, Frederick	6, St. James's Pla.	
Calvert, John W., M.D.	11, Blandf.-pl.R.P.	
Calvert, N.	. .	Hunsdon, Ware, Herts.
Cannon, J. S.	. .	Beckley, Oxford
Capel, William	. .	Grove, Stroud, Gloucestershire
Capper, Mrs.	. .	Hailsham House, Hailsham, Sussex
†Carew, W. H. Pole	. .	Antony House, Devonport, Devon.
Carlisle, The Lord Bishop of	15, Grosvenor-street	Rose Castle, Wigton, Cumberland
Cary, Rev. H.	. .	Cowley House, near Oxford
Carnegie, Rev. J.	. .	Seaford, Sussex
Carrington, Lord	. .	The Abbey, High Wycombe, Bucks.
Carrington, Geo., Jun.	. .	The Abbey, Great Missenden, Bucks.
Carter, John Bonham	. .	Ditcham Grove, Petersfield, Hants.
Carter, J. Thomas	. .	Hunstanton, Lynn, Norfolk
Carter, J. R.	. .	Spalding, Lincolnshire
†Cartwright, Thomas W.	. .	Ragnall Hall, Newton, Newark, Notts.
Casson, —	. .	Ditchley Park, near Woodstock, Oxon.
Casswell, Thomas	. .	Poynton, near Lincoln
Castle, Benjamin	. .	Oxford
Castree, J.	. .	Gloucester
Catlin, Thomas W.	. .	Chillesford, Orford, Suffolk
†Cator, Rev. Thomas	. .	Skelbrooke Park, Doncaster, Yorksh.
Caudwell, William	. .	Drayton, Abingdon, Berks.
Cavendish, Hon. Geo. H., M.P.	. .	Ashford Hall, Bakewell, Derbyshire
Cayley, Ed. Stillingfleet, M.P.	. .	Wydale, Malton, Yorkshire
Chamberlain, Henry	. .	Desford, Leicestershire
Champion, Thomas A.	. .	Sarr, Thanet, near Canterbury, Kent
Chandler, Thomas	. .	Stockton-upon-Tees, Durham
Chapman, Thomas	. .	Stoneleigh, Coventry, Warwickshire
Chapman, Thomas		
Chapman, George	3, Arundel-st., Strd.	
Charge, Thomas	3, Arundel-st., Strd.	Barton, Darlington, Durham
Charlton, Thomas Parfect	. .	Tonbridge, Kent
Chase, William, jun.	. .	Weston, Petersfield, Hants.
Chaundy, Richard	. .	Oxford
Chawner, Richard Croft	. .	Wall, Lichfield, Staffordshire
Cherry, George Henry	. .	Denford, Hungerford, Berks.
Chichester, J. P. Bruce, M.P.	24, Chester-st. Gr. p	Arlington House, Barnstaple, Devon.
Chillingworth, William	. .	Cuddesden, Tetsworth, Oxon.
Chisman, John	. .	Stockton-upon-Tees, Durham
†Cholmeley, Sir Mont. J., Bart.	. .	Easton Hall, Coltersworth, Lincolnshire
Chrisp, Thomas	. .	Hawk Hill, Alnwick, Northumberland
Christie, Langham	. .	Preston Deanery, Hackleton, Northam.
†Chrystie, William	20, Chester-tr. R. pk	
Church, Robert	. .	Bishopstoke, Westbury, Wiltshire
Chute, W. Wiggett	. .	Pickenham Hall, Swaffham, Norfolk
Clapham, —	. .	Lay Hill Common, Chesham, Bucks.
Clark, Joseph	. .	Maidenhead, Berkshire
Clarke, C. J.	. .	Egham, Surrey
Clarke, Joseph, Jun.	. .	Ashby, Sleaford, Lincolnshire
Clarke, K.	35, Southampt.-bls.	
Clarke, Rev. C.	. .	Henstead, Beccles, Suffolk
Clarke, Edward	. .	Canwick, near Lincoln
Clarke, Rev. John	. .	Chertsey, Surrey
Clarke, John	. .	New Parks, near Leicester
Clarke, Thos. E.	. .	Chard, Somersetshire
Clarke, Richard	. .	Baldon, Oxford
†Clay, William, M.P.	. .	Fulwell Lodge, Twickenham, Middlsx.
Clayden, John	. .	Littlebury, Saffron Walden, Essex

Members.	Town Residence.	Country Residence.
Cleeve, Henry	. .	Rettendon, Wickford, Essex
Clements, Viscount, M.P.	2, Grosvenor-sq.	Rynn, Mohill, Leitrim, Ireland
Clifton, Capt. T.		
Clinch, J. W.	. .	Witney, Oxfordshire
Clode, William	. .	Bakeham House, Egham, Surrey
Close, John	. .	Great Linford, Newport Pagnell, Bucks.
Clutton, John	8, Parliament-st.	
Clutton, Robert	8, Parliament-st.	Hartswood, Reigate, Surrey
Cobb, Henry	18, Lincoln's-Inn F	
Cobb, Robert	. .	Town Place, Faversham, Kent.
Cobb, Timothy Rhodes	. .	Banbury, Oxon.
Codrington, O. Calley	. .	Wroughton, Swindon, Wiltshire
†Colebrooke, Sir Jas. E., Bart.	. .	Colebrooke Park, Tonbridge, Kent
Coles, James	. .	Stratton-Audley, Bicester, Oxon.
Collett, Russell,	. .	The Jungle, near Lincoln
Collingwood, J. V.	. .	Abingdon, Berkshire
Collins, Rev. T. F.	. .	Betterton, Wantage, Berkshire
Cole, Richard John		Chertsey, Surrey
Collard, Edwin	. .	Chislett Park, Chislett, Kent
Collard, Thomas W.	. .	Canterbury, Kent
Collyer, Rev. —	. .	Holkham, Norfolk
Colville, Frederick		
Colvin, B. B.	. .	Monkhams Hall, Waltham Abbey, Esx.
†Compton, Henry Combe, M.P.	16, CarltonHo.-ter.	Minstead Manor Ho., Lyndhurst, Hants
Compton, Richard	. .	Eddington, Hungerford, Berks.
Connop, H., Jun.		
Cook, Rev. Joseph George	. .	Purley Hall, near Reading, Berkshire
Cook, John	. .	Down-Ampney, Cirencester, Glouc.
Cook, John	. .	Hothorpe, Welford, Northamptonshire
Cook, Rev. T. L. B.	. .	Oxford
Cooke, Layton	12, Pall Mall	
†Cooke, P. Davies	. .	Owston, near Doncaster, Yorkshire
Cooke, Rev. T. L.	. .	Beckley, near Oxford
Cooling, John	. .	Lower Winchindon, Thame, Oxon.
Cooper, Isaac	. .	The Bucklands, Bury-St.-Edmund's, Suff
Cooper, J. G.	. .	Blythburgh, Southwold, Suffolk
Cooper, Samuel	. .	Henley-on-Thames, Oxon
Cooper, Thomas	. .	Norton, Seaford, Sussex
Cooper, Thomas	. .	Swineshead, Lincolnshire
Cooper, W. D.	. .	Highgate, Middlesex
Copeland, Joseph	. .	Abingdon, Berkshire
Copeland, William	. .	Abingdon, Berkshire
Cormack, William	Covent Garden	
Cormack, William John	Covent Garden	
Cornish, Rev. J. J.	. .	Kenwyn, Truro, Cornwall
Corrance, Frederick	. .	Loudham Park, Woodbridge, Suffolk
Corrie, Adam	. .	Wellingborough, Northamptonshire
Cother, William	. .	Middle Aston, Woodstock, Oxon.
Cottam, George	Winsley-st., Oxf.-s.	
Cotterell, Sir J. Geers, Bart.,	. .	Garnons, near Hereford
Cottingham, L. O.	. .	Reydon, Southwold, Suffolk
Courtney, W.	. .	Newton-Stacey, Whitchurch, Hants.
Coverdale, John	1, Field-ct. Gr's I.	Oak Lodge, Kilburn, Middlesex
Couling, Charles	. .	Rye Farm, Abingdon, Berks.
Coyney, W. Hill	. .	Weston Coyney, Lane End, Staffs.
Cozens, Daniel G., Jun.	. .	Bickenhall, Taunton, Somerset.
Cradock, Sheldon	. .	Hartforth Hall, Richmond, Yorkshire
Cragg, William	. .	Threckingham, Folkingham, Lincolns.
Cramp, John M.	. .	St. Peter's, Isle of Thanet, Kent
Cramp, John	. .	Gurlinge, Margate, Kent

Members.	Town Residence.	Country Residence.
Cripps, Edward		Cirencester, Gloucestershire
Cripps, Joseph, M.P.		Cirencester, Gloucestershire
Cripps, Thomas		Oxford
Cripps, Raymond		Cirencester, Gloucestershire
†Crisp, Thomas		Gedgrave Hall, Orford, Suffolk.
Croft, Sir John, Bart., F.R.S.	45, Brook-street	Cowling Hall, Yorkshire
Crofton, Thomas		Holywell, Durham
Crompton, John Bell		Milford, near Derby
Croome, James		Acton Hall, Berkeley, Stroud, Glouc.
Cross, W. J.		
Crosse, Henry		Boyton Hall, Stowmarket, Suffolk
Crosse, James		Gingley, Retford, Notts
Crouch, A. W.		Ridgmount, Woburn, Bedfordshire
Crowdy, Richard		Faringdon, Berkshire
Cubley, Samuel		Quarrington, Sleaford, Lincolnshire
†Cure, Capel	2, Devonshire-pl.	Blake Hall, Ongar, Essex
Currie, Henry	29, Cornhill	West Horsley Pk., Leatherhead, Surrey
Currie, Edmund		Oakley House, Abingdon, Berkshire
Currie, Raikes, M.P.	4, Hyde Park-ter.	
Curteis, Herbert B.	19, Bridge-st., Wstr	Peasemarsh, Rye, Sussex
Curtis, Adml. Sir Lucius, Bart.		Gatcombe House, Portsmouth, Hants.
Dadds, John, sen.		Wingham, Kent
Dadds, John, Jun.		St. Nicholas, Thanet, Kent
Darlington, Earl of	40, Upp. Brook-st.	
Dashwood, Francis	9, Seymore-place	Halcot, Bexley, Kent
Dashwood, Rev. Samuel Vere		Stanford, Loughborough, Leic.
Daubeny, Chas., M.D., F.R.S.		Oxford University
Davey, George		Dorchester, near Benson, Oxfordshire
Davey, William		South Park, Headon, Hull, Yorks.
Davenport, George		Oxford
David, Evan		Radyr Court, Cardiff, Glamorganshire
Davies, Evan		Paton, Wenlock, Salop
Davies, D. Saunders	United Univ. Club	Pentre, Newcastle,—Emlyn, Caermartn
Davies, Rev. Thomas		Jesus' College, Oxford
Davies, W. H.	Church-st., Chels.	
Davis, Hewitt	Haymarket	Spring Park, Croydon, Surrey
Davis, John		Banbury, Oxfordshire
Davis, William		Bicester, Oxfordshire
Davis, William	202, Strand	
†Davis, Samuel		Swerford Park, Banbury, Oxon.
†Davis, Richard	St. Helen's-place	Skeynes, Edenbridge, Seven Oaks, Kent
Davison, Crawford		Pierepoint, Farnham, Surrey
Davison, Thomas		Durham
Dawson, Edward E.		Ingthorpe, Stamford, Lincolnshire
Dawson, Edward		Aldcliffe Hall, Lancaster
Day, Isaac		Northleach, Gloucestershire
Dean, Rev. Edmund N.		Alderleys, near Gloucester
Dean, James	248, High Holborn	The Yews, Tottenham, Middlesex
Deane, Ralph		Escourt House, Reading, Berks.
Deare, Thomas		Longworth, Great Faringdon, Berks.
Dearlove, John		Brightwell, Wallingford, Berks.
Deedes, William		Sandling, Hythe, Kent
†Denbigh, Earl of		Newnham Paddock, Lutterworth, Leic.
Dennis, Robert		Greetham, Horncastle, Lincolnshire
Dent, Joseph		Ribsten Hall, Wetherby, Yorkshire
Denton, Thomas		Lew, Bampton, Oxfordshire
De Visme, Rev. James		Bath, Somersetshire
Devon, Earl of	4, Bryanstone-sq.	Powderham Castle, Exeter, Devon.

Members.	Town Residence.	Country Residence.
Dewe, Thomas		
†Dewing, R.	. .	Carbrooke, Watton, Norfolk
†Dickens, Charles Scrace	. .	West Stoke, Chichester, Sussex
Dickson, Robert	. .	East Wickham, near Welling, Kent
Dilke, Captain, R.N.	. .	Maxstoke Castle, Coleshill, Warwicksh.
Dillon, Viscount	. .	Ditchley Hall, near Woodstock, Oxon
†Divett, Edward, M.P.	20,Chpl.-st,Grov-pl	Bystock, Exmouth, Devon.
Dixon, Charles	. .	Stanstead Park, Chichester, Sussex
Dixon, E.	. .	Ashwood House, Dudley, Worcestersh.
Dixon, George	. .	Oxford
Dixon, Henry	. .	Witham, Essex
Dixon, Henry	. .	Oxford
Dixon, Robert Walker	. .	Wickham Bishops, Witham, Essex
Dobito, George	. .	Kirtling Hall, Newmarket, Cambridges
Dodd, George	. .	Chenies, Rickmansworth, Herts.
Dodd, W. J., Jun.	. .	Checkendon, Wallingford, Oxfordshire
Dodds, Thomas	. .	Standish Hall, Wigan, Lancashire
Dolphin, J.	. .	Swafield, North Walsham, Norfolk
Donaldson, John Strangeways	15,Southmp.-st,Str.	
Dormer, C. C.	. .	Rousham, Woodstock, Oxon.
Dormer, W.	. .	East Hanney, Abingdon, Berks.
Drake, C. B.		
Drake, T. T.	. .	Shardloes, Amersham, Bucks.
†Drax, J. S. W. S. Erle	. .	Charborough Park, Blandford, Dorset.
Drewett, Thomas	. .	Guildford, Surrey
Drewett, Thomas, jun.	. .	Guildford, Surrey
Drewitt, Robert	. .	Peppering, Arundel, Sussex
Driver, Edward	Richmond-tr,Wh.	Vassall Road, North Brixton, Surrey
Driver, George N.	Richmond-tr,W h.	
Druce, Samuel	. .	Ensham, near Oxford
Druce, Joseph	. .	Ensham, near Oxford
†Drummond, Andrew Robert	2, Bryanstone-sq.	Cadland, Nw. For, Southampton, Hants
Drury, George	. .	Eastbourne, Sussex
Duckworth, John	. .	Barnet, Herts.
Duff, A.	. .	Woodcot Ho., Henley-on-Thames, Oxon.
Duffield, Christopher	. .	Grantham, Lincolnshire
Duke, Charles	. .	East Lavant, Chichester, Sussex
Duke, Henry	. .	Earnley, Chichester, Sussex
Dunn, Thomas	. .	Kintbury, Newbury, Berks.
Dunning, Ralph	. .	Bishop's Burton, Beverley, Yorkshire
Dyer, George	. .	East Tisted, Alton, Hants.
Dyke, Rev. H. S.	. .	Polynt, Cornwall
Dymoke, Hon. Champion	10, Whitehall-pl.	Scrivelsby Court, Horncastle, Lincolnsh.
Eale, W. H. B.	. .	Holton Park, near Oxford
Eames, John	. .	Ashby-de-la-Zouch, Leicestershire
Edgell, Edgell Wyatt	. .	Milton Place, Egham, Surrey
Edgington, Benjamin	Duke-st. Southwrk.	
Edmonds, Albert	. .	Inglesh, Lechlade, Gloucestershire
Edmonds, William	. .	Kilmscott, Lechlade, Gloucestershire
Edwardes, Hon. George	. .	Noyadd Llanarth, Aberyron
Edwardes, Hon. William	. .	Edmondthorpe, Oakham, Rutlandshire
Edwards, John	. .	Oxford
Edwards, Frederick	1, Stafford-pl. Pim.	Barnham, Thetford, Norfolk
Edwards, E.		
Edwards, Henry	. .	Sutton, Woodbridge, Suffolk
Edwin, John	. .	Sheriff's Linch, Worcestershire
†Elliott, John	. .	Chapel Brampton, near Northampton
Ellis, John, M.P.	5, Hereford-st, P.L.	

Members.	Town Residence.	Country Residence.
Ellison, Michael	. .	Sheffield, Yorkshire
Ellison, William	. .	Syzergh Castle, Kendal, Westmoreland
Ellman, Rev. H. J.	. .	Charlton Rectory, Bedford
Ellman, John	. .	Glynde, Lewes, Sussex
Ellman, R. H.	. .	Glynde, Lewes, Sussex
Ellman, Thomas	. .	Beddigham, Lewes, Sussex
Elphick, William	. .	Steyning, Sussex
Elton, George	. .	Redland, near Bristol
Elwood, Lieut. Col. C. W.	. .	Clayton Priory, Brighton, Sussex
Enley, William	. .	Oxford
Ensworth, Thomas	. .	Oxford
Enys, John Samuel	. .	Enys, near Penryn, Cornwall
Erle, Rev. Christopher	. .	Hardwicke, Aylesbury, Bucks.
Etches, J. C.	. .	Liverpool
Etwall, William	. .	Penton, Andover, Hants
Evans, Richard	. .	Tyn Park, Cardiff, Glamorganshire
Evans, Rev. W.	. .	Pusey, Faringdon, Berkshire
Evans, W.	. .	Hackney, Middlesex
Evans, Isaac Pearson	. .	Evans Griff, Coventry, Warwickshire
Eve, Richard	. .	Silsoe, near Bedford
Everitt, Isaac	6, Torrington-sq.	South Creak, Fakenham, Norfolk
Ewen, Thos. L'Estrange	. .	Dedham, Essex
Eyston, Charles	. .	Hendred, Wantage, Berkshire
Eytre, William	. .	Stanton, Shiffnal, Salop
Fairthorne, Henry	. .	Brightwell, Wallingford, Berks.
Faithful, Rev. G.	. .	Lower Heyford, Bicester, Oxon.
Fane, J.	. .	Wormsley, Stoken-Church, Oxon.
Fardell, John	. .	Lincoln
Farmer, Edward	. .	Fazeley, Tamworth, Staffordshire
Farrer, Rev. Richard	. .	Ashley, Rockingham, Northampt.
Farrow, Benjamin B.	. .	Ipswich, Suffolk
Farrow, W.	. .	Market Rasen, Lincolnshire
Faulkner, Wm.	. .	Burford, Oxfordshire
Faulkner, John	. .	North-Hinksey, near Oxford
Faulkner, Thomas	. .	Queenford, Dorchester, Dorset.
Faux, Joseph	. .	Cold-Ashby, near Northampton
Fawcett John William	. .	Sedbergh, Yorkshire
Fearon, —, Sen.		
Feilden, William, M.P.	14, Hanover-st.	Feniscowles, Blackburn, Lancashire
Fernie, William	. .	Woodchester, Stroud, Gloucestershire
Field, William	. .	Ulceby, Barton, Lincolnshire
Fielden, Joseph	. .	Whillen, Blackburn, Lancashire
Fiennes, Hon. Wm. Twisleton	1, D, Albany	Broughton Castle, Banbury, Oxfordsh.
Filliter, George		
Finch, Richard	. .	Headington, near Oxford
Finlayson, Dr.	. .	Cheltenham, Gloucestershire
Fisher, John	. .	East Hanney, Abingdon, Berks.
Fisher, Rev. R. W.	. .	Hill Top, Kendal, Westmoreland
Fisher, Thomas Richard	. .	Oxford
Fisher, William	. .	Copyhold, Newbury, Berkshire
Fletcher, Sir Henry, Bart.	. .	Ashley Park, Walton-on-Thames, Surr.
Flesher, Rev. J. T.	. .	Tiffield, Towcester, Northampton.
Flight, Thomas	. .	Laycock's Dairy, Islington, Middlesex
Floyd, Thomas	. .	Frilford, Abingdon, Berks.
Floyer, J. G.	. .	Ketsbyn, Louth, Lincolnshire
†Floyer, John	. .	Stafford, Dorchester, Dorset.
Foll, William	. .	Chalgrave, Dunstable, Beds.
Footner, W. A.	. .	Romsey, Hampshire

Members.	Town Residence.	Country Residence.
Fordham, John George	. .	Odsey House, near Royston, Herts.
Fordham, John Edward	. .	Melbourn Bury, Royston, Cambridgesh.
Foreman, Thomas	. .	Acton-Burnell, Much-Wenlock, Salop.
Foreshew, William	. .	Meysey-Hampton, Fairford, Gloucester
Formby, Rev. James	. .	Frindsbury, Rochester, Kent
Forster, John	18 Carey st, Ln-inn	Newton-le-Willows, Bedale, Yorks.
Forster, Robert	. .	Tottenham, Middlesex
Fort, George	. .	Alderbury House, Salisbury, Wilts.
Foster, J. W.	. .	Clapham, near Settle, Yorkshire
Foster, Ebenezer	. .	Anstey Hall, Cambridge
Foster, Richard, Jun.	. .	Cambridge
Foster, Joseph	. .	Witham, Essex
Fothergill, Richard	. .	Bridge House, Kendal, Westmoreland
Fowlis, Rev. Henry	. .	Little Brickhill, Fenny-Stratford, Bucks.
Fowke, William	. .	Rudgeley, Staffordshire
Fowler, Henry	. .	Kingham, Chipping-Norton, Oxon.
Fowler Thomas	Prince's-st, Bank	Tottenham, Middlesex
Fowler, William M.	25, Bentk-st, Cav-sq	Sunning Hill, Windsor, Berkshire
Fowlie, William	. .	Red House, Hursley, Winchester, Hants
Fox, Rev. Dr.	. .	Queen's College, Oxford
Fox, Francis	. .	Tottenham, Middlesex
Ffrance, T. R. Wilson	. .	Rawcliffe Hall, near Preston, Lancashire
†Franklin, Richard	. .	Clementstone, Bridgend, Glamorganshi.
Franklin, Edward L.	. .	Ascott, near Benson, Wallingford, Oxon.
Franklin, John	. .	Ewelme, near Benson, Wallingford, Oxon
Fraser, Alexander	. .	Flamstead Bury, Redbourn, Herts.
Frazer, Alexander	. .	Middle-Claydon, Winslow, Bucks.
Freeman, John	. .	Rudham, Rrougham, Norfolk
Freeman, Thomas	. .	Henham, Wangford, Suffolk
Freere, Rev. E.	. .	Finningham, Eye, Suffolk
Fremantle, Rt Hon Sir W, GCH	. .	Englefield Green, Chertsey, Surrey
Frost, W. F.	. .	Thorrington, Colchester, Essex
Fryer, William, R.	. .	Lytchott, Wareham, Dorset.
Fuge, Robert	. .	7, Drury Square, Clifton, Bristol
Fullagar, James	. .	Milton, Sittingbourne, Kent
Fullard, Thomas	. .	Thorney, Peterborough, Northamptons.
Fullerton, Colonel John	. .	Thrybergh Hall, near Rotherham, York.
Fuller, Hugh	. .	Portslade, Brighton, Sussex
Fulljames, Thomas	. .	Hasfield Court, near Gloucester
Fulljames, Thomas, jun.	. .	Hasfield Court, near Gloucester
Fulshaw, Richard	. .	Knighton, near Leicester
Gabb, Baker	. .	Abergavenny, Monmouthshire
Gabell, Charles	. .	Holyfield, nr Crickhowel, Brecknocksh.
Gage Hon. W.	. .	Westbury House, Bp's Waltham, Hants.
Gamble, John	. .	Manor Farm, Shouldham Thorpe, Norf.
Gape, Thomas Foreman	. .	St. Alban's, Hertfordshire
Gardner, Austen	. .	Beaksbourn, near Canterbury, Kent
Gardner, Rev. Christopher	. .	East Dean, near Southampton, Hants.
Gardner, James	. .	Adderbury, Banbury, Oxfordshire
Gardner, James	. .	Banbury, Oxfordshire
Gardom, Thomas	. .	The Yell, Baslow, Bakewell, Derbyshire
Garne, William	. .	Aldsworth, Northleach, Gloucestershire
Garnett, Christopher	. .	Low Sizergh, Kendal, Westmoreland
Garrard, Charles Drake	. .	Lamer Hall, Hatfield, Herts.
Garrett, Richard, jun.	. .	Leiston, Saxmundham, Suffolk
Gater, Caleb H.	. .	Swansling, near Southampton, Hants.
Gater, Edward	. .	Townhill, near Southampton, Hants.
Gater, W. B.	. .	West End, near Southampton, Hants.

Members.	Town Residence.	Country Residence.
Gates, George	. .	Steyning, Sussex
Gates, Richard	. .	Marshall Vale, Bramby, Guildford, Sur.
Gedney, John	. .	Redenhall, Harleston, Norfolk
Gee, Thomas	. .	Barton, Lincolnshire
Gibbon, Alexander	. .	Staunton, near Newnham, Glouces.
Gibbs, George	26, Down-st., Pic.	
Gibbs, Joseph	. .	Elsfield, near Oxford
Gibbs, Thomas	. .	Ampthill, Bedfordshire
Gibbs, William	. .	Alveston Hill, Stratford-on-Avon, War.
Gibbs, William	. .	Itchenor, Chichester, Sussex
Giblett, John	8, West Smithfield	
Gibson George John	. .	Sandgate Lodge, Storrington, Petwth Sus
Giddy, C., Com. R.N.	. .	Penzance, Cornwall
Gilbertson, Matthias	. .	Elm Cottage, Egham, Surrey
Gilbert, Rev. A. T.	. .	Hippenscombe, Wiltshire
Gilbert, George	. .	Colchester, Essex
Gilbert, William	. .	Oxford University
Gillett, Joseph	. .	Little Haseley, Tetsworth, Oxfordshire
Gillett, Joseph Ashby	. .	Banbury, Oxfordshire
Gillett, William	. .	Southleigh, Witney, Oxfordshire
Gilliat, Aitkin	. .	Scrofield, Horncastle, Lincolnshire
Gills, W.	. .	Alveston Heath, Stratford-on-Avon, War.
Gladwin, Thomas	. .	Marden Park, Godstone, Surrey
Glaister, Henry R.	. .	Bedale, Yorkshire
Glaister, Rev. William	. .	University College, Oxford
Glover, John	. .	Bangley, Tamworth, Staffs.
Goard, Richard	. .	Hartlip, Sittingbourne, Kent
Goddard, Horatio N.	. .	Cliff, Wootton Bassett, Wiltshire
Goddard, Edward	. .	Crookham, Newbury, Berkshire
Goddard, Philip		
Goddard, Rev. Richard	. .	Broadstone, Church Euston, Oxon.
†Godfrey, Edward	. .	OldHall, East-Bergholt, Hadleigh, Suffk
Godfrey, George	. .	Childrey, Wantage, Berkshire
Godfrey, Thomas	. .	Chawley, near Oxford
Godwin, John	. .	Durweston, Blandford Forum, Dorset.
Godwin, Richard	. .	Durweston, Blandford Forum, Dorset.
Goldhawk, Rowland, Jun.	. .	Hazle Hall, Sheer, Guildford, Surrey
Gonne, Thomas George	. .	Great Vaynor, Narbeth, Pembrokeshire
Good, George	. .	Gussage, Blandford, Dorset.
†Goodden, John	. .	Compton House, Sherborne, Dorset.
Goodenough, Joseph	. .	Nether-Cerne, Dorchester, Dorset.
Goodhall, Michael	. .	Evelith Manor, Shiffnal, Salop
Goodlake, T. Mills	. .	Wadley House, Faringdon, Berks.
Goodlake, Thomas	. .	Benhams, Wantage, Berks.
Goodricke, Sir Francis L.H., Bt.	. .	Studley Castle, Alcester, Warwickshire
Gore, Ormsby, M.P.	66. Portland-place	
†Goring, Harry Dent, M.P.	Windham Club .	Highden, Shoreham, Sussex.
Goring, Mrs.	. .	Wiston Park, Steyning, Sussex
Goring, Charles	. .	Wiston Park, Steyning, Sussex
Gorring, J. P.	. .	Eastbourne, Sussex
Gorring, Mrs. J. P.	. .	Eastbourne, Sussex
Gosford, William	. .	Everingham, Pocklington, Yorkshire
Gosling, Benjamin.	19, Fleet-street .	Roehampton Grove, Surrey
Gough, Frederick	. .	St. Alban's, Hertfordshire
Gould, John	. .	Poltimore, Exeter, Devonshire
Gower, G.	. .	Dilham, North Walsham, Norfolk
†Gower, W. Leveson, Jun.	33, Low. Brook-st.	Titsey Place, Godstone, Surrey
Gowing, Edward	. .	Eye, Suffolk
Graburn, R. S.	. .	Branswell Cottage, Sleaford, Lincolns.
Graburn, William	. .	Barton-on-Humber, Lincolnshire

Members.	Town Residence.	Country Residence.
Grace, James	. .	Wordrobes, Risborough, Bucks.
Grace, Rev. H. T.	. .	Jovington, Eastbourne, Sussex
Graham, Captain, R.N.	. .	Netherby Hall, Longtown, Cumberland
Graham, Rev. H. G.		
Grain, Rev. Charles	. .	Linton, Cambridgeshire
Grain, P.	. .	Shelford, Cambridgeshire
Granger, Thomas	. .	Stretham, Cambridgeshire
Grant, J. C.	. .	Stamford, Lincolnshire
Grant, William, Jun.	1, Plowden-bs., Tem.	Litchborough, Towcester, Northampton
Grantham, Stephen	. .	Stoneham, Lewes, Sussex
Grantham, Rev. Thomas	. .	Bramber, Steyning, Sussex
†Gratwick, W. G. K.	. .	Ham, Arundel, Sussex
Greaves, Robert	. .	Bloxholm, Sleaford, Lincolnshire
Greaves, Edward	. .	Barford, near Warwick
Greaves, William	. .	Bakewell, Derbyshire
Green, Richard	. .	Great Gonnerby, Grantham, Lincolns.
Green, —		
Green, Rev. G. W.	. .	Court-Henry, Llandeilo, Narbeth, Pem.
Green, William.	5, Up. Seymour-st.	
Greene, W. Burnaby	. .	Wickham, Bishop's Waltham, Hants.
Greenaway, Charles, M.P.	. .	Barrington Grove, Burford, Oxfordshire
Greenwood, Charles	. .	Wallingford, Berkshire
†Gregg, Thomas	. .	Coles Park, Hertfordshire
Gregory, Arthur F.	. .	Styvichal Hall, Coventry, Warwicks.
Gregory, William	. .	Cirencester, Gloucestershire
Gregory, Thomas	. .	Cutslow, Oxfordshire
Gresley, Rev. W.	. .	St. Charles, Lichfield, Staffordshire
Grey, Sir Chas. Edw., Bt., M.P.	. .	The Oaks, Carshalton, Surrey
Grey, John	. .	Dilston, Newcastle, Northumberland
Grey, W. H. C.	10, Cmb.-pl., N. Rd.	Clifton, near Bristol, Gloucestershire
Griffin, John	. .	Hemel-Hemstead, Hertfordshire
Griffith, C. Darby	. .	Padworth House, Reading, Berkshire
Griffith, Mrs. Darby	. .	Padworth House, Reading, Berkshire
Griffith, Samuel Y.	. .	Oxford
Grimshaw, W.	. .	Hackney, Middlesex
Groome, Charles	. .	Sompting, Shoreham, Sussex
Grove, L.	. .	Shenstone Park, Lichfield, Staffords.
†Grove, Thomas	. .	Fern, Shaftesbury, Dorsetshire
Guerrier, William	8, West Smithfield	
Guillemard, John L., F.R.S.	27, Gower-street	Clavering, Stansted-Montfitchet, Essex
Gunner, William	. .	Well Hall, Alton, Hampshire
Gurdon, Rev. Philip	. .	Cranworth, Shipdam, E. Dereham, Nflk.
Gurdon, William	10, Crown O. Temp.	
Guy, George	. .	Turl, Oxfordshire
Gwilt, Rev. Daniel	. .	Icklingham Rectory, Mildenhall, Suffk.
Gwynne, Captain A. L.	. .	Monachty, Cardiganshire
Hack, James	. .	Bowley, Chichester, Sussex
Haines, Edward	. .	Stratton, Cirencester, Gloucestershire
Halcomb, William	. .	Poulton, Marlborough, Wiltshire
Halcomb, W. H.	. .	Hungerford, Berkshire
Hale, Edward	. .	Hambledon, Horndean, Sussex
Hale, Thomas	. .	East Hanney, Abingdon, Berks.
Halke, Rev. J	. .	Weston-by-Welland, Northamptonshire
Halton, John		
†Hall, John	. .	Wiseton, near Bawtry, Nottinghamsh.
Hall, John	. .	Bretforton, Evesham, Worcestershire
Hall, George Webb	. .	Sneed Park, Bristol
Hall, Henry	. .	Holbrook, Wincanton, Somersetshire

Members.	Town Residence.	Country Residence.
Hall, James	. .	Scorborough, Beverley, Yorkshire
Hall, Richard	. .	Cirencester, Gloucestershire
Halsted, Thomas	. .	Woodcote, near Chichester, Sussex
†Hamilton, Captain Archibald	. .	Rozelle, near Ayr, N.B.
Hammans, C.	. .	Garford, Abingdon, Berkshire
Hammersley, Hugh	69, Pall Mall . .	Great Haseley, Tetsworth, Oxfordshire
Hammond, Thomas	. .	Ashley, Newmarket, Cambridgeshire
Hamond, Wm. P.	123, Mount street	
Hanbury, John	. .	Carborough, Lichfield, Staffordshire
Hanbury, Osgood	. .	Coggeshall, Essex
Hancock, Abraham	. .	Hall Place, Rockley, Alton, Hants.
Handley, Major	. .	Pointon, Folkingham, Lincolnshire
Hanmer, Lieutenant-Colonel	. .	Bear Place, Maidenhead, Berks.
Hannam, George	. .	Alland Grange, Isle of Thanet, Kent
Hannam, Henry S.	. .	Burcott, Bensington, Oxfordshire
Hannen, Henry, Jun.		
Hanson, John	37, Seymour-place	
Harcourt, Capt. Octavius, R.N.	. .	Swinton Park, Bedale, Yorkshire
Harcourt, W. B.	. .	St. Leonard's, Windsor, Berks.
Harding, Joseph	. .	Maiden-Bradley, Mere, Wiltshire
Hardman, Edward	. .	Royal Dublin Society, Dublin
Hardy, J.	. .	Tendring Hall, Colchester, Essex
Hare, Joseph	. .	Wilton Farm, Beaconsfield, Bucks
†Hare, John	. .	Springfield, Bristol
Harford, John Scandret, F.R.S.	. .	Blaize Castle, near Bristol
Harford, W.	. .	Barly Wood, Bristol
Harris, George Hemington	. .	Cambridge
Harris, John	. .	Hinton, Abingdon, Berkshire
Harris, Richard	. .	Wootton Grange, Northamptonshire
Harris, William	. .	Weston, Leamington, Warwickshire
†Harrison, Richard	. .	Wolverton, Stony-Stratford, Bucks.
Harrison, Daniel	. .	Kendal, Westmoreland
Harrison, Rev. J.	. .	Dinton, Aylesbury, Buckinghamshire
Harrison, John	. .	The Bank, Bakewell, Derbyshire
Harrison, John	. .	Home Farm, Stow Bardolph, Norfolk
Harrold, O. W.	. .	Donnington Court, Ledbury, Herefordsh.
Hart, H. P.	. .	Beddingham, Sussex
Harvey, Robert Blyth	. .	Harleston, Norfolk
Harvey, Robert H.	. .	Sturminster, Newton, Dorsetshire
Harwood, Thomas	. .	Winterfold, Kidderminster, Worcestersh
Hartley, W. H. H.	. .	Bucklebury House, near Newbury, Berks.
Haselfort, R. L.	. .	Boreham, Chelmsford, Essex
Hasler, Richard	. .	Aldingbourne, Chichester, Sussex
Hastings, John	. .	Longham, East Dereham, Norfolk
Hastings, Matthew	. .	Ensham, Witney, Oxfordshire
Hawkesley, Rev. J. W.	. .	Redruth, Cornwall
†Hawkins, Thomas	. .	Assington, Neyland, Suffolk
Hawkins, William	. .	Hitchin, Hertfordshire
Hawkins, William	. .	Colchester, Essex
Hawkins, J. H.	. .	Dorchester, Dorset.
Hawkins, John	. .	Hitchin, Hertfordshire
Hawtrey, John		
Haynes, William	. .	Handborough, Woodstock, Oxfordshire
Hayward, William	. .	Hintlesham, Hadleigh, Suffolk
Hayward, Drinkwater S.	. .	Frocester Court, Stroud, Gloucestershire
Hayward, J. Curtis	. .	Quedgeley, near Gloucester
Hayward, Henry	. .	Watlington, Henley-on-Thames, Oxf.
Hayward, Robert	. .	Colchester, Essex
Hayward, William	. .	Manor House, Weston Turville, Bucks
Headley, Henry	. .	Cambridge

Members.	Town Residence.	Country Residence.
Heald, Dr.	. .	Spalding, Lincolnshire
Hearn, Stephen	. .	Broom, Alcester, Warwickshire
Heath, Sergeant	. .	Kitlands, Dorking, Surrey
Heighton, Edward		
Heiver, John		
Heming, Henry	. .	Brampton, Northamptonshire
Heneage, Geo. H. Walk., M.P.	. .	Compton Bassett, Calne, Wilts.
Henning, James	. .	Wolverton, Dorchester, Dorset.
Hercy, John	. .	Hawthorn Hill, Bracknell, Berks.
Herrick, William	. .	Bear Manor Park, Loughboro', Leicest.
Herver, Joseph		
Hervey, Lionel	. .	Winkfield, Bracknell, Berkshire
Heseltine, William	. .	Worlaby House, Barton, Yorkshire
Hester, George P.	. .	Oxford
Hewer, Jasper	. .	Minchinhampton, Gloucestershire
Hewer, John	. .	Hampton Lodge, near Hereford
Hewer, Joseph	. .	Eastington, Northleach, Gloucest.
Hewer, William	. .	Northleach, Gloucestershire
Hewitt, Lieut. R.N.	. .	Eastbourne, Sussex
Heygate, Robert	. .	West Haddon, Daventry, Northampton
†Heywood, Sir Benjamin, Bt.	. .	Acresfield, Pendleton, Manchester
Hicks, Leonard	5, Gray's-Inn-sq.	
Hicks, Benjamin	. .	Hanley, Newcastle-under-Lyne, Staff.
Hickson, Richard	. .	Hougham, Grantham, Lincolnshire
Higgins, William	. .	Hambledon, Horndean, Hants.
Higgins, W. B.	. .	Picts' Hill, Bedfordshire
Hill, Rev. C.	. .	Buxhall, Stowmarket, Suffolk
Hill, Charles	. .	Wellingborough, Northamptonshire
Hill, Henry	. .	Sledmere, Malton, Yorkshire
Hillyard, Clark	. .	Thorpelands, near Northampton
Hincks, T. C.	. .	Breckenborough, Thirsk, Yorkshire
Hind, James	. .	Morebairns, Lutterworth, Leicestershire
Hind, William	. .	Groby, Leicestershire
Hinton, William	. .	Daglingworth, Cirencester, Gloucesters.
Hinxman, Edward, Jun.	. .	Little Durnford, Salisbury, Wilts.
Hitchcock, Henry	. .	Bodicot House, Banbury, Oxfordshire
Hitchman, S.	. .	Chipping-Norton, Oxfordshire
Hitchings, George	. .	Oxford
Hoare, Captain	. .	Wavendon, Fenny-Stratford, Bucks.
Hoare, Hugh Richard	100, Eaton-square	Lillingstone, Towcester, Northamp.
Hobbs, Henry	. .	Bocking, Braintree, Essex
Hobbs, William	. .	Bocking, Braintree, Essex
Hobbs, William	. .	Hythe, Kent
Hobbs, William Fisher	. .	Mark's Hall, Coggeshall, Essex
Hobgen, Charles	. .	Sidlesham, Chichester, Sussex
Hobgen, Joseph	. .	Sidlesham, Chichester, Sussex
Hoblyn, William Paget	. .	Marlhouse, Elmstead, Bromley, Kent
Hodgkinson, Richard	. .	Morton Grange, Retford, Notts.
Hodson, W.	. .	Ilford, Essex
Hodson —	. .	Falmer Court Farm, Lewes, Sussex
Holbeach, William	. .	Farnborough, Kineton, Warwickshire
Holcombe, Rev. G. F.	. .	Brinkley, Newmarket, Cambridgeshire
†Hollist, Hasler	. .	Lodsworth, Midhurst, Sussex
Holmes, William Sandcroft	. .	Redenhall, Harleston, Norfolk
Holton, Rev. L. M.	. .	Woolhampton, Newbury, Berkshire
Hony, Rev. P. F.	Athenæum Club	
Honywood, Rev. P. J.	. .	Mark's Hall, Coggeshall, Essex
Hooton, John Head	. .	Kempston, near Bedford
Hopcraft, Alfred	. .	Halse, Brackley, Northamptonshire
Hopkins, John	. .	Tidmarsh House, Reading, Berks.

Members.	Town Residence.	Country Residence.
Hopper, Richard	. .	Papplewick, near Nottingham
Horlock, J. W.	. .	The Rooks, Marshfield, Tetbury, Glouc.
Hornby, Hugh	. .	Ribby Hall, Kirkham, Lancashire
Hornsby, Richard	. .	Grantham, Lincolnshire
Horwood, John	. .	Stean Park, Brackley, Northamptonsh.
Hoskins, Kedgwin, M.P.	90, Sloane street	Birch House, Ross, Herefordshire
Hoskins, Sir Hungerford, Bt.	. .	Harewood, Ross, Herefordshire
Hoskyns, Chandos Wren	10, Chester-square	Wroxhall Abbey, Warwickshire
Houblon, Richard Archer	. .	Cooper's-dale, Epping, Essex
Houghton, John	. .	Broom Hill, Sunninghill, Windsor, Brks.
Houldsworth, Thomas, M.P.	16, Suffolk-street	Portland Place, Manchester, Lanc.
House, John	. .	Anderson, Blandford Forum, Dorset.
House, John, jun.	. .	Quarlstone, Blandford Forum, Dorset.
Howard, Charles	. .	14, Monkgate, York
Howard, George	. .	Hemel Hempstead, Herts.
Howard, Hon. Henry	. .	Charlton, Malmesbury, Wilts.
Howard, H.	. .	Greystock, Penrith, Cumberland
Howard, Joseph	. .	Aylesbury, Bucks.
Howard, T. A.	. .	Yattendon, near Newbury, Berks.
Howard, —	. .	Aylesbury, Bucks.
Howard, Col. Sir R., Bt., M.P.	Belgrave-square	Bushy Park, Bray, Wicklow
Huckvale, Thomas	. .	Over-Norton, Chipping-Norton, Oxon.
Hudson, John	. .	Castleacre, Swaffham, Norfolk
Hull, Richard	. .	Sutton-Benger, Chippenham, Wilts.
Humfrey, J.	. .	Upton, Abingdon, Berks.
Humfrey, John	. .	Upton, Abingdon, Berks.
Humfrey, William	. .	Boxford, Newbury, Berks.
Hunt, James	. .	Oxford
Hunt, Zachary D.	. .	Aylesbury, Bucks.
Hurrell, Reymes	. .	Brandon Hall, Suffolk
Husband, T., jun.	. .	Stoke, Devonport, Devon.
Hutley, William	. .	Witham, Essex
Hutt, John	. .	Water Eaton, near Oxford.
Hutt, William	. .	Thrupp, Woodstock, Oxon.
Hutton, John	. .	Sowber Hill, Northallerton, Yorkshire
Hutton, William	. .	Gate Barton, Gainsbro', Lincolnshire
Ide, John	. .	West Wittering, Chichester, Sussex
Ifill, Dr.	9, Welbeck-street	
Ilott, James A.	. .	Bryanston, Blandford Forum, Dorset.
Inge, Captain		
Ingram, Hugh	. .	Steyning, Sussex
Ingram, Rev. James, D.D.	. .	Trinity College, Oxford
Inskip, Thomas	. .	Marston, Ampthill, Bedfordshire
Irving, John, M.P.	. .	Halliford, Chertsey, Surrey
Isaacson, John	. .	Clare, Suffolk
Iveson, John	1, Richmond-terr.	Ashford, Staines, Middlesex
Izard, William	. .	Grafton-in-Beckford, Gloucestershire
Jackman, James	. .	Crendon, Thame, Oxfordshire
Jackson, Hugh	. .	Wisbeach, Isle of Ely, Cambridgeshire
Jaques, R. M.	. .	St. Trinian's, Richmond, Yorkshire
Jarratt, William	. .	Lletai, Bridgend, Glamorganshire
†Jarrett, John	. .	Camerton House, Bath, Somerset.
Jeffrys, R.	. .	Structshill, Bridgewater, Somerset.
Jellicoe, John	. .	Beighterton, near Shiffnal, Salop.
Jemmett, Henry	. .	Burford, Oxfordshire
Jenkins, John	. .	St. Y-Nill, Cardiff, Glamorganshire
Jenner, Henry	. .	Chisenbury, Pewsey, Wiltshire
Jennings, R. F.	. .	Belsham Green, Sandwich, Kent

Members.	Town Residence.	Country Residence.
Jersey, Earl of,	38, Berkeley-squa.	Middleton Park, Bicester, Oxfordshire
Jervis, Sir Raymond	. .	Fair Oak Park, Winchester, Hants.
Jobson, Robert	. .	Turrelaws, Wooler, Northumberland
Jobson, William	. .	Newtown, Wooler, Northumberland
Jodrell, Sir Rd.Paul, Bt. FRS.	64, Portland-place	Sall Park, Reepham, Norfolk
Johnson, Rev. A.	. .	Hampton House, Devon.
Johnson, Rev. Dr.	. .	Perran, Cornwall
Johnson, Cuthbert William	14, Gray's-inn-sqre	Wallingtons, Newbury, Berks.
Johnson, George	53, Tavistock-squ.	
Johnson, Theophilus Fairfax		Spalding, Lincolnshire
Johnston, Rt.Hon. Sir Al. Bt.	19, Gt. Cumbrl.-pl.	York House, Twickenham, Middlesex
Johnston, Sir F., Bart.	. .	Melton Mowbray, Leicestershire
Johnstone, John Hutton	. .	Menston, near Ledbury, Herefordshire
Jonas, Samuel	. .	Ickleton, Saffron Walden, Essex
Jones, Edward	. .	Shiffnal, Salop.
Jones, Philip, Jun.	. .	Sugwas Court, near Hereford
Jones, John	. .	Harrington, Spilsby, Lincolnshire
Jones, Whitmore	. .	Chassleton, Chipping Norton, Oxon.
Jones, William	. .	Sheep House, near Gloucester
Jordan, Rev. G. W.	. .	Waterstock, Thame, Oxfordshire
Jowett, Rev. J. F.	. .	Kingston, Bagpuze, Abingdon, Berks.
Juckes, Thomas	. .	Fearn, Salop.
Kedward, James D.		
†Kemble, Horatio		Leggatt's, near Hatfield, Hertfordshire
†Kemble, Thomas	125, Piccadilly .	Leggatt's, near Hatfield, Hertfordshire
Kendall, Samuel	. .	H. M. Norf. Farm, Sunninghill, Chertsey
Kendle, C. J.	. .	Fordham, Downham Market, Norfolk
Kendle, James	. .	Weasenham, Fakenham, Norfolk
Kennaway, Sir John, Bart.	. .	Escot, Honiton, Devonshire
Kensey, George	. .	Cornbury Park Farm, Witney, Oxon.
Keppel, Hon. and Rev. Thos.	. .	Warham, Wells, Norfolk
Kersey, James	. .	Talton, Cirencester, Gloucestershire
Kersey, Robert	. .	Cross, Hadleigh, Suffolk
Kett, George Samuel	. .	Brooke House, Norwich, Norfolk
Kilby, George	. .	Queeniborough, Leicestershire
Kilson, Rev. H.	. .	Folkington, Hailsham, Sussex
Kimberley, George	. .	Trotsworth, Egham, Surrey
Kimber, Thomas	. .	Fyfield Wick, Abingdon, Berks.
Kimber, Thomas	. .	Bourton-on-the-Water, Stow, Glo'ster
Kimber, Thomas	. .	North Cerney, Cirencester, Gloucester.
†Kinder, John	. .	Sandridge Bury, St. Alban's, Herts.
Kinder, Thomas	. .	Sandridge Bury, St. Alban's, Herts.
King, Bolton	. .	Umberslade, Warwickshire
†King, Charles	. .	Little Brinton, Northamptonshire
King, F.	. .	Oxford
King, Fielder	. .	Buriton, Petersfield, Hants.
King, J. Bennett	. .	Wotton, Abingdon, Berkshire
King, John	. .	Loxwood House, Petworth, Sussex
King, Joseph	. .	Whitehall, Stourbridge, Worc.
King, Rev. James	. .	Henley-on-Thames, Oxfordshire
King, Robert	. .	Wytham, near Oxford
King, W. F.	. .	Stourton, Mere, Wiltshire
†Kingscote, Thomas	. .	Kingscote, Tetbury, Gloucestershire
†Kingsmill, William	. .	Sydmonton Park, Newbury, Berks.
Kinsman, Rev. R. B.		
Kintore, Earl of	. .	Keith Hall, Aberdeen
Kirby, John	. .	South Moreton, Wallingford, Berks.
Knapp, H.		
†Knatchbull, William	. .	Babington, Frome, Somersetshire

Members.	Town Residence.	Country Residence.
†Knight, Henry Gally, M.P.	69, Grosvenor-st.	Firbeck Hall, Bawtry, Yorkshire
Knight, Edward	. .	Godmersham Park, Canterbury, Kent
Knight, E. Jun.	. .	Chawton House, Alton, Hants.
Lacey, James Murray	20, Carey-st. Ln. I. F.	
La Coste, Thomas B.	. .	Abbey Mills, Chertsey, Surrey
Lakin, Henry	. .	Severn End, Upton, Worcestershire
Lamb, William	. .	Hay Carr, Ellel, Lancaster
Lance, Edward Jarman	95, Albany-street	Barrossa Cottage, Bagshot, Surrey
Lane, John	5, Inner Temp.-lan.	
Langdale, Hon. Charles, M.P.	31, Jermyn-street	Houghton Hall, Market-Weighton, York
Langford, T. C.	. .	Udinore, Rye, Sussex
Large, Charles	. .	Broadwell, Burford, Oxfordshire
Large, William	. .	Upper Lambourn, Berkshire
Latham, R. Cousins	. .	Clifton, Dorchester, Oxfordshire
†Law, Rev. R. V.	3, Up. Geo.-st. M. sq.	Christian-Malford, Chippenham, Wilts.
Lawford, Edward	. .	Leighton-Buzzard, Bedfordshire
Lawford, John	. .	Mount Pleasant, Tottenham, Middlesex
Lawford, W. R.	. .	Leighton-Buzzard, Bedfordshire
Lawrance, William	. .	Peterborough, Northamptonshire
Lawrence, Capt. J. R.	. .	East Harptree, Wells, Somersetshire
Lawrence, James	. .	Astree, Berkshire
Lawrence, R.	. .	Betterton, Wantage, Berkshire
Lawson, Andrew	. .	Aldborough Lodge, Boroughbridge, York
Lawson, Robert	11, Keppel-st. R. sq.	
Lawson, W. C.	. .	Edinburgh
Layburn, Daniel	. .	Eske, Beverley, Yorkshire
Layburn, Jonathan	. .	Wold Cottage, Bridlington, Yorkshire
Laxton, R. W.	. .	Morborn, Stilton, Huntingdonshire
Leach, George	. .	Stoke, Devonport, Devonshire
Le Couteur, Colonel John	. .	Belle-Vue, Jersey
Lediard, Thomas	. .	Cirencester, Gloucestershire
†Lee, Lee J.	. .	Delington House, Ilminster, Somerset.
Lees, Charles	. .	Eastling, Faversham, Kent
Lees, George Wyld	47, Fleet-street	
Lefevre, John G. Shaw, F.R.S.	5, Hyde Park-gard.	
Lefroy C. E.	. .	Emshot House, Farnham, Surrey
Leifchild, John	Moorgate-st., Fins.	
Lemmon, Charles	. .	Coltshall Farm, Shouldham, Norfolk
Lescher, Joseph	. .	Boyles, Brentwood, Essex
Lethbridge, Sir Thos. B., Bart.	6, Upp. Blgrave-st.	Sandhill Park, Taunton, Somerset.
Lewis, John	. .	Llanthetty Hall, near Brecon, S. W.
Lewis, Edward	. .	Bayford Bury, near Hertford
Lewis, Robert	. .	Stompain, Blandford, Dorset
Ley, Rev. Jacob	. .	Oxford
Ley, Jacob	. .	Christ Church, Oxford
Lidbetter, Richard	. .	Bramber, Steyning, Sussex
Liddon, John William	. .	Hemel Hempstead, Hertfordshire
Liefchild, W. G.	. .	Enfield, Middlesex
Lilford, Lord	10, Grosvenor-pl.	Lilford Hall, Oundle, Northamptonshire
Lincoln, Earl of	25, Park-lane	Ranby Hall, Retford, Nottinghamshire
Lindsell, R.	. .	Biggleswade, Bedfordshire
Lines, W.	. .	Haddenham, Thame, Oxfordshire
Linnell, Richard		
†Linton, Rev. James	. .	Hemingford, St. Ives, Huntingdonshire
Lipscomb, John	. .	Petersfield, Hampshire
Lismore, Viscount	11, Up. Belgrave-st.	Shanbally Castle, Clogheen, Ireland
Little, William Hunter	. .	Lanvair Grange, Abergavenny, Monm.

Members.	Town Residence.	Country Residence.
Littlewood, John		Armthorpe, Doncaster, Yorkshire
Livesay, Thomas		Hackney, Middlesex
Lloyd, Cynnic		Pontryfyth, Denbigh, North Wales
Lloyd, L. F. Lloyd		Pontryfyth, Denbigh, North Wales
Lloyd, Llewellyn		Pontryfyth, Denbigh, North Wales
Lloyd, Rev. T.		Swayfield, North Walsham, Norfolk
Lloyd, Rev. Thomas J.		North Wraxall, Chippenham, Wilts
Lloyd, W.		Aston, Oswestry, Salop.
Lock, George		Oxford
Lock, George		Blandford, Dorsetshire
Loft, William		Trusthorpe, Alford, Lincolnshire
Long, Walter	29, Mill-street	Preshaw House, Alton, Hampshire
Long, Walter J.		Preshaw House, Alton, Hampshire
Longstaff, Charles		
Lord, C.		Bridge Norton, Witney, Oxon.
Lord, Richard		Hambleden, Henley-on-Thames, Oxon.
Lousley, Job		Hampstead-Norris, East Ilsley, Berks.
Lovesey, C. W.		Charlton Kings, Cheltenham, Glouc.
Lowe, Charles		Stamford, Lincolnshire
Lowndes, William		Brightwell, Tetsworth, Oxon.
Lucan, Earl of	Spntine-ter, Knisbg	Laleham, Staines, Middlesex
Lucas, Joseph		Rowsham, Aylesbury, Bucks.
Lugor, Elwood		Hengrave, Bury St. Edmund's, Suffolk
Lumbert, R. C.		Burghleigh Hill, Reading, Berks.
Lunn, Robert, jun.		Norton, Evesham, Worcestershire
Lush, Joseph		Kilmington, Bruton, Somersetshire
Lyne, William		Kingham, Chipping-Norton, Oxon.
†Lyon, James Wittit	39, Belgrave-sq.	Miserdine Park, near Cirencester, Glouc.
Mabbott, William Courthop		Lewes, Sussex
Macbride, David, D.C.L.		Oxford
Macdonald, Alexander	3, St. Mildred's-ct.	
†Mackenzie, Sir Francis A., Bt.	60, Lombard-street	Cowan House, Dingwall, Ross-shire, NB.
Maclaine, Colonel		
Macnamara, A.		Langoed Castle, Brecknock
Macneill, Forbes		Grove Lodge, Hayes, Middlesex
Maitland, F. C.		
†Mainwaring, Townshend	Mincing-lane	Marchiviel Hall, Wrexham, Denbigh
Malins, Daniel		Brackley, Northamptonshire
Mallam, Thomas		Oxford
Maltby, Edward Harvey	11, Pap-bds. Temple	
Manby, Capt. Geo. W., F.R.S.		Yarmouth, Norfolk
Manning, John		Harpole, near Northampton
†March, Earl of	51, Portland-place	Goodwood Park, Chichester, Sussex
Marden, William		Rainham, Essex
Margetts, William		Woodstock, Oxfordshire
Marmont, James		Bristol
Marriott, Rev. George		Kemberton Rectory, Shiffnal, Salop
Marsh, John	32, Bucklersbury	
Marshall, Captain Henry	4, Upp. Eaton-st.	
Marshall, John		Eden Lodge, Beckenham, Kent
Marshall, Thomas Gould		Harvington Lodge, Evesham, Worces.
Marshall, William, M.P.	41, Upp. Grov.-st.	Patterdale Hall, Carlisle, Cumberland
Marshall, William		Hurst, Brighton, Sussex
Marsham, Charles W.		Stratton Strawless Hall, Aylesham, Nk.
Marsham, R.		Merton College, Oxford
Marsham, Robert	61, Up: Seymour-st	Stratton Strawless Hall, Aylesham, Nfk.
Martin, Edward Wenman	33, Eaton-place	Brickwood House, Croydon, Surrey
Martin, Henry Burgess		Colston Hall, Bingham, Nottinghams.

Members.	Town Residence.	Country Residence.
Martin, Robert	. .	Asterby, Horncastle, Lincolnshire
Martin, Thomas	. .	Ashton Underhill, Gloucestershire
†Mason, C. A.	. .	Farrinton, Ledbury, Hereford
Mason, John	. .	Wornsditch Farm, Kimbolton, Hunts.
Massingberd, Rev. Algernon	. .	Gunby Park, Spilsby, Lincolnshire
Massop, John		
Masters, Joseph	. .	Witney, Oxfordshire
Masters, Robert		
Mathews, Isaac	. .	Marlston, Newbury, Berks.
†Mathews, J.	. .	Park Hall, Kidderminster, Worcestersh
Maton, James	. .	Collingbourne, Pewsey, Wilts.
Matson, Charles	. .	Baddow Park, Chelmsford, Essex
Matson, Robert	. .	Wingham, Kent
Matthew, John		
Matthews, John	. .	Oxford
Matthews, Peter	. .	Elkstone, Cirencester, Gloucestershire
Matthews, Stephen	. .	Lidiard, Swindon, Wiltshire
Maugham, John	. .	Jerveaux Abbey, Bedale, Yorkshire
Mauleverer, William	. .	Arncliffe Hall, Cleveland, Yorkshire
Maw, George	. .	Walk House Barrow, Lincolnshire
Mawclark, William	. .	Strood, Rochester, Kent
Maxwell, William Constable	. .	Everingham Park, Pocklington, Yorks.
May, Charles	. .	Ipswich, Suffolk
Maydwell, Daniel	. .	Leatherhead, Surrey
Mayhew, Joseph	. .	Petmarsh, Essex
Mayne, John Thomas, F.R.S.	Temple	Teffont House, Salisbury, Wilts.
Mellor, James	. .	Shiffnal, Salop
Menteath, Sir Chas. G. S., Bt.	. .	Closeburn Hall, Dumfries, N. B.
†Metcalfe, C. J., Jun.	. .	Roxton House, St. Neot's, Huntingdons.
Michell, Edward	. .	Steyning, Sussex
Middleton, Captain	. .	Leasingham, Sleaford, Linc.
Milden, T.	. .	Brinnington Hill, Warwick
Mildmay, P. St. John, M.P.	21, Edw-st, Port-sq	Hasle Grove House, Sherborne, Dorset.
Miller, Rev. M. H.	. .	Scarborough, Yorkshire
Miller, William	. .	Watereaton, near Oxford
Millington, Bryan	. .	Asgarby, Sleaford, Lincolnshire
Mills, C. S.	. .	Newbury, Berkshire
Mills, Rev. William	. .	Shellingford, Faringdon, Berks.
Mills, John	. .	Ulceby Barton, Lincolnshire
†Milne, Alexander	Whitehall	
Milnes, John L.	24, Holles-st. Cav-sq	Hilgay Lodge, Downham Market, Norf.
Milnes, R. Monckton, M.P.	26, Pall Mall	Fryston Hall, Pontefract, Yorkshire
Minet, Charles William	. .	Brasted, Sevenoaks, Kent
Mitchell, James Henry	. .	Heath Cottage, Banbury, Oxon.
Monck, J. B.	. .	Coley Park, Reading, Berks.
Monckton, G.	. .	Stretton, Penkridge, Staffordshire
Montefiore, J. B.	16, Geo st. Man-ho.	
Montgomerie, C. M.	. .	Garboldisham Hall, Harling, Norfolk
Moody, C. A.	. .	Kingsdown, Ilchester, Dorset.
Moor, Major Edward, F.R.S.	. .	Bealings, Woodbridge, Suffolk
Moore, George	. .	Banbury, Oxfordshire
Moore, George F.	. .	Perth, Swan River, Australia
Moore, Rev. H.	. .	Willingdon, Eastbourne, Sussex
Mordaunt, Rev. C.	. .	Badgworth Cross, Axbridge, Somerset.
Morgan, George	. .	Biddlesden Park, Brackley, Northamps
Morland, G. B.	. .	Abingdon, Berkshire
Morrell, Frederick J.	. .	Oxford
Morrell, James, Jun.	. .	Headington Hill, Oxford
Morrell, Mark T.	. .	Oxford
Morton, Henry	. .	Denham, Buckinghamshire

Members.	Town Residence.	Country Residence.
Morton, John Chalmers	. .	Chester Hill, Stroud, Gloucestershire
Mount, Thomas	. .	Saltwood, Hythe, Kent
Mount, William	. .	Wasing-place, Newbury, Berkshire
Mountford, ——	. .	Barrows Farm, Lambourn, Berkshire
Mumford, George	. .	Downham-Market, Norfolk
Mules, William	. .	The Grove, Colchester, Essex
Munday, S.	. .	Abingdon, Berkshire
Mundy, H.	. .	Andover, Hampshire
Mundy, J.	. .	Culham, Abingdon, Berks.
Murray, John	Albemarle-street	
Mushett, James	. .	Lambsquay, Dean Forest, Glouc.
Muskett, John	. .	Farnham, Bury St. Edmund's, Suffolk
Myers, John Dyneley	. .	Langford, Lechlade, Gloucestershire
Myers, Thomas	. .	Langford, Lechlade, Gloucestershire
Nalder, John	. .	Northmoor, near Oxford
Nash, Charles	. .	Royston, Hertfordshire
Nash, John	. .	Reigate, Surrey
Nash, Joseph	. .	Reigate, Surrey
Nash, W.	. .	Langley, Bucks.
Neale, Stephen	. .	Tytherington, Warminster, Wiltshire
Neale, H. St. John	. .	Ringwood, Hampshire
Neame, Charles	. .	Selling, Faversham, Kent
Neame, Frederick	. .	Selling, Faversham, Kent
Neame, John	. .	Selling, Faversham, Kent
Neame, Thomas	. .	Canterbury, Kent
Neave, Sheffield	6, Albemarle-st.	
Neeld, John, M.P.	6, Grosvenor-squr.	Red Lodge, Cricklade, Wiltshire
Neeve, ——		
Nelson, Rev. J.	. .	Childrey, Wantage, Berkshire
Neve, John	. .	Tenterden, Kent
Neve, Thomas	. .	Benenden, Cranbrook, Kent
Newman, Charles	. .	Hayes, Southall, Middlesex
Newnham, Henry		
Newton, Marcellus	. .	Wareham, Hereford
Newton, M.	. .	Wareham, Hereford
Newton, Richard	. .	Britwell, Watlington, Oxon.
Niblett, D. J.	. .	Haresfield, Stroud, Gloucestershire
Nicholds, M.	. .	Saffron-Walden, Essex
Nicholson, William Henry	1, Robert-st., Adel.	Upnor, Rochester, Kent
Nicholson, Brady	. .	Wootton Barrow, Lincolnshire
Nicklin, Richard	. .	Tipton, near Birmingham, Warwicksh.
Noakes, T.	. .	Warncocks, near Eastbourne, Sussex
Norreys, Lord, M.P.	40, Grosvenor-sq.	Wytham Abbey, near Oxford
Norris, W. John	. .	Radwell House, Baldock, Herts.
North, Frederick	. .	Rougham, Swaffham, Norfolk
North, Lieut.-Col.	. .	Wroxton Abbey, Oxon.
Northcote, Henry Stafford	. .	Pyne's, Exeter, Devonshire
Northeast, Thomas	University Club	Tedworth, near Andover, Hants.
Northey, Edward S.	. .	Epsom, Surrey
Northhouse, William Spencer	2, Storey's Gate	
Nott, John		
Noyes, Finch	. .	Laverstock Hall, Salisbury, Wilts.
Noyes, Thomas H.	. .	East Mascalls, Lindfield, Sussex
Oakley, Thomas	. .	Water End Farm, Sandridge, St. Alban's
Oakley, John	. .	Larkin Hall, Frindsbury, Rochester, Kt.
O'Brien, Stafford	. .	Blatherwick Park, Stamford, Lincolns.
Ogle, Henry	. .	Eastbourne, Sussex

Members.	Town Residence.	Country Residence.
Oldham, Thomas	. .	Saltflectby, Louth, Lincolnshire
Oliver, William		
Oliver, John	. .	Abingdon, Berkshire
†Oliverson, Richard	14, Portland-place	
Oliver, James	. .	Handford, Blandford Forum, Dorset.
Onley, Charles Savill, F.R.S.	Grt. Geo.-st. West.	Stisted Hall, Braintree, Essex
Orlebar, R. Lonquet	. .	Hinwick Ho., Wellingborough, Northam.
Ormond, William	. .	Wantage, Berkshire
Osbinton, Samuel	. .	East Rainham, Norfolk
Osborne, Charles	. .	Hayling, Emsworth, Hampshire
Overman, C. E.	. .	Burnham Westgate, Norfolk
Overman, T. W.	. .	Maulden, Ampthill, Bedfordshire
Overman, John	. .	Burnham Sutton, Burnham Westg. Norf.
Overman, Henry	. .	Weasenham, Fakenham, Norfolk
Owen, Thomas	. .	Kentbury, Newbury, Berks.
Packe, Colonel H.	. .	Twyford Hall, Guist, Norfolk
Padwick, Frederick	. .	West Thorney, Chichester, Sussex
Pagden, ——	. .	Eastbourne, Sussex
Paget, George	. .	Sutton Bonington, Kegworth, Leic.
Paget, Charles	. .	Ruddington Grange, near Nottingham
Paget, Henry	. .	Birstall, Leicestershire
Paicey, Robert	. .	Chedgelow, Tetbury, Gloucestershire
Pain, Philip	. .	Boughton House, Kettering, Northamp.
Paley, William Frankland	. .	Gladdon, near Leeds, Yorkshire
Palmer, Ellis	. .	Caston, Watton, Norfolk
Palmer, George, M.P.	11, King's Arms yd.	Nazing Park, Waltham Abbey, Essex
Palmer, William	. .	East-Garston, Lambourn, Berks.
Palmer, Henry	. .	Brightwaltham, East Ilsley, Berks.
Palmer, John	. .	Hearn, Kent
Papillon, Thomas	. .	Maydeacon, Canterbury, Kent
Parham, William	. .	Sutton-Veny, Warminster, Wilts.
Park, Rev. Waldegrave	. .	Ince Hall, Cheshire
Parker, Thomas A. W., M.P.	9, Conduit-street	Ensham Hall, Witney, Oxfordshire
Parker, Christopher C.	. .	Woodham-Mortimer, Maldon, Essex
Parker, Rev. E.	. .	Bicester, Oxfordshire
Parker, Henry	. .	Fairford, Gloucestershire
Parker, Adm. Sir Hyde, Bart.	. .	Melford Hall, Long Melford, Suffolk
Parker, Oxley	. .	Woodham-Mortimer, Maldon, Essex
Parker, Thomas W.	. .	Henley-on-Thames, Oxfordshire
Parker, William	. .	Oxford
Parker, William		
Parkes, J. W. H.	. .	Mawbey Gate, Alresford, Hants.
Parkinson, John	. .	Leyfields, Ollerton, Notts.
Parkinson, Richard	. .	Muskham Villa, Newark, Notts.
Parratt, H. M.	. .	Effingham House, Leatherhead, Surrey
Parrott, G.	. .	Oxford
Parrott, ——	. .	Somers Town, near Oxford
Parry, Samuel	. .	Clanes, nr Worcester
Parry, G. F.	. .	Duisk Lodge, Ayrshire.
Parsons, John	. .	Oxford
Parsons, George	. .	West Lambrook, Langport, Somerset.
Parsons, J. M.	6 Raym. Bgs. Gry's I	
Parsons, William, jun.	. .	Wilnecote, Tamworth, Warwickshire
Partridge, Henry Samuel	. .	Hockham Hall, East Harling, Norfolk
Passand, Rev. J.	. .	Shipton Charwell, Woodstock, Oxon.
Passmore, Edward	. .	Wraysbury, Staines, Bucks.
†Patterson, W. J.	. .	Durnford Lodge, Wimbledon, Surrey
Paul, W.	. .	Pentney, Lynn, Norfolk

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Members.	Town Residence.	Country Residence.
Paull, Matthew	. .	Compton-Paunceford, Wincanton, Som.
Paxton, William	. .	Langford Farm, Bicester, Oxon.
Payn, William	. .	Kidwells, Maidenhead, Berkshire
Peacock, John A.	. .	Osbourn-by-Folkingham, Lincolnshire
Peacock, A.	. .	Ranceby, Sleaford, Lincolnshire
Peacock, Wilkinson	. .	Thorpe, Tilvey, Sleaford, Lincolnshire
Pearse, R. M.	. .	Nill Farm, Hook Norton, Banbury, Oxon
Pearse, George	. .	Harlington, Ampthill, Bedfordshire
Peel, Bolton	. .	Purley, near Reading, Berkshire
Peel, Rev. F.	. .	Culham, Abingdon, Berkshire
Peel, J.	. .	Culham, Abingdon, Berkshire
Peel, Jonathan	. .	Willingham, Lincolnshire
Peel, William	. .	Culham, Abingdon, Berkshire
Peers, Charles	. .	Chislehampton, near Oxford
Pell, Paul Francis	. .	Tupholme Hall, nr Wragby, Lincolnsh.
†Pell, Sir W. Owen	. .	Synell Hall, Northamptonshire
Pell, Edwin	. .	Synell Hall, Northamptonshire
Penfold, Hugh	. .	Annington, Steyning, Sussex
Penoyre, Rev. L.	. .	The Moor, Hay, Herefordshire
Penson, Thomas	. .	Foscott, Oxford
Peppercorn, Henry	. .	Aylesford, Maidstone, Kent
Percival, John, jun.	Albion Club	Northampton
Percival, Thomas	. .	Wanford, Northamptonshire
Perkins, Frederick	. .	Chipstead-place, Sevenoaks, Kent
Perkins, Henry	. .	Hanworth Park, Hounslow, Middlesex
Perkins, Joseph	. .	Laughton, Market-Harborough, Leices.
Perkins, Thomas	. .	Willesborough Court, Ashford, Kent
Perry, G. W.	Fore-street, City	
Peters, John Weston	. .	South-Petherton, Somerset.
Peyton, Henry	. .	Stratton Hall, Norfolk
†Philips, J. Burton	10, Park Cresent	
†Philips, Sir George, Bart.	. .	Weston House, Chipping Norton, Oxon.
†Philips, George Richard, M.P.	12, Hill-st., Berk-sq.	
Phillipps, James	. .	Bryngwyn Ragland, Monmouthshire
Phillips, John	. .	Culham, Abingdon, Berkshire
Phillips, John	. .	Charnage Farm, Mere, Wilts.
Phillips, Joseph	. .	Ardington, Wantage, Berks.
Phillips, Richard	. .	Brockton Grange, Shiffnal, Salop.
Phillips, Sir Thomas, Knt.	. .	Newport, Monmouthshire
Phillpotts, Rev. T.	. .	Gwennap, Cornwall
Phipps, John	. .	River, near Dover, Kent
Phipps, Thomas Hele, Jun.	. .	Leighton House, Westbury, Wilts.
Pickering, Leonard	. .	Welcot, Witney, Oxfordshire
Pickin, William John	. .	Whitemoor, Ollerton, Notts.
Pigot, Grenville	. .	Doddershal House, Aylesbury, Bucks.
Pilcher, Charles	. .	Oxford
Pilcher, Jesse	. .	Cheriton Court, Sandgate, Kent
Pillans, William		
Pinckard, John Thomas	. .	Handley, Towcester, Northamptonshire
Pinfold, Charles	. .	Twine, Surrey
Pinfold, John	. .	Oxford
Pinney, William, M.P.	30, Berkeley-sq.	The Park, Somerton, Somersetshire
Pinnix, J. A.	. .	West Dean, Chichester, Sussex
Pinnock, Rev. George	. .	Wyre, near Pershore, Worcestershire
Pinnock, Rev. H.	. .	Moroah, Penzance, Cornwall
Pittman, Rev. T.	. .	Eastbourne, Sussex
Platt, George Edward	. .	Denne Park, Horsham, Sussex
Platt, John Clarke.	22, Ludgate-street	
Plestow, C. Berners	. .	Wattington Hall, Downham, Norfolk
Plummer, James	. .	Ensham, near Oxford

Members.	Town Residence.	Country Residence.
Plummer, John	. .	Siddington, Cirencester, Gloucestershire
Pocock, Charles	. .	Sulham, Reading, Berkshire
Pocock, J. Hall	. .	Bothamsted, East Ilsley, Berks.
Polhill, William	. .	Eyford, Stow, Gloucestershire
Poole, Edward	. .	Hornend, Ledbury, Herefordshire
Pope, Edward	. .	Toller-Porcorum, Beaminster, Dorset.
Porter, Edward	. .	Moor Critchell, Dorset.
Porter, William	. .	Hembury Fort, Honiton, Devon.
Potter, R.	. .	Lydden Court, Dover, Kent
Potterton, J. Faulkner	. .	Stowe, nr Towcester, Northamptonshire
†Powell, Alexander	. .	Hurdcott House, Wiltshire
Powell, George	. .	Boston Road, Brentford, Middlesex
Powell, W.	. .	Marcham, Abingdon, Berks.
Pownall, Henry	. .	Spring Grove, Isleworth, Middlesex
Powys, Henry P.	. .	Hardwicke House, Oxford
Pratt, Sampson	. .	Bruern Abbey, Oxford
Pratt, William	. .	Newfield, Southam, Warwickshire
Pressly, Charles	Somerset House	
Pretyman, Rev. R.		
Price, Thomas	. .	Gaer, near Brecon, S. W.
Price, H.		
Price, Henry	. .	Heriotts, Hartlip, Sittingbourne, Kent
Pridgold, H.		
Pryme, George, M.P.	. .	Cambridge
Punnet, Rev. J.	. .	St. Gotta, Cornwall
Purchas, R. W.	. .	Pilstone, near Monmouth
Purratt, John	. .	Moins Farm, near St. Albans, Herts.
Purser, John	. .	Willington, near Bedford
Putland, John	. .	Firle Place Farm, Lewes, Sussex
Quantrill, ——	. .	Southampton, Hants.
Quarrell, Thomas	. .	Crossthorne, Worcestershire
Randall, Richard	. .	Tunbridge Wells, Kent
Randolph, Rev. Charles	. .	Kimpton Lodge, Andover, Hants.
Ransome, James	. .	Ipswich, Suffolk
Ransome, Robert	. .	Ipswich, Suffolk
Ransome, J. Allen	. .	Yoxford, nr Ipswich, Suffolk
Rason, William	. .	Eastbourne, Sussex
Ravenhill, John	. .	Warminster, Wiltshire
Rawden, C. Wyndham	. .	Eastbourne, Sussex
Rawlence, George Curtis	. .	Parsonage, Fordingbridge, Hants.
Rawlinson, A. T.	. .	Chadlington, Chipping-Norton, Oxon.
Reay, John, Jun.	. .	East Dulwich, Surrey
Rebow, Gurdon	. .	Wivenhoe Park, Colchester, Essex
Reid, George	8, Clar.ter, Regs-pk	Woodmanstone, Ewell, Surrey
Rendlesham, Lord	. .	Rendlesham House, Wickham-Mk. Suk.
Rham, Rev. W. L., M.A.	. .	Winkfield, Bracknell, Berkshire
Rhodes, J. A.	. .	Horsforth Hall, Leeds, Yorkshire
Rice, James	. .	Cotton End, Northamptonshire
Rice, Edward Royd, M.P.	16, Suffolk-street	Dane Court, near Wingham, Kent
Rich, E. W.	. .	Didmarton, Tetbury, Gloucestershire
Richards, James	. .	Dumbleton, Whinchcombe, Gloucesters.
Richards, Rev. Thomas	. .	Aberystwith, Cardiganshire
Richardson, William	. .	Great Limber, Lincolnshire
Ricketts, Henry J.	. .	The Grove, Brislington, nr Bristol, Som.
Riddell, Edward	. .	Cheeseburn Grange, Newcast.-on-Tyne
Ridgway, James	169, Piccadilly	

Members.	Town Residence.	Country Residence.
Riddick, William	. .	Cirencester, Gloucestershire
Ridley, Rev. C. J.	. .	University College, Oxford
Rigg, Robert, F.R.S. . . .	2, Chatham-place	
Risley, Rev. W. C. . . .	. .	Deddington, Oxfordshire
†River, John		
Roberts, J.		
Roberts, John L.	. .	Ditchley, Sussex
Roberts, Joseph	. .	Waterperry, Wheatley, Oxon.
Roberts, Robert	. .	Ranceby, Lincolnshire
Roberts, ——		
Robertson, Daniel	13, Austin Friars	
Robins, B.	. .	East Lavant, nr Chichester, Sussex
Robins, Henry	. .	Asps, nr Warwick
Robinson, Michael	. .	Heston, Hounslow, Middlesex
Robinson, Thomas	. .	Oxford
Robinson, Rev. W. B. . . .	. .	Lithington, Sussex
Robinson, William	. .	Albion Place, Hemel-Hempstead, Herts.
Robinson William	. .	Bletsoe, near Bedford
Rodd, F. H.	. .	Trebartha Hall, Launceston, Cornwall
Roden, George	. .	Sutton Maddock, Shiffnal, Salop.
Rodwell, Joshua	. .	Alderton, Woodbridge, Suffolk
Roe, Henry R.	. .	Graton Hall, Yealmpton, Devonshire
Rogers, H.	. .	Boston, Lincolnshire
Rogers, John	. .	Melchbourn, Bedfordshire
Rogerson, John.	Camden Town	
Rogerson, Joseph	Camden Town	
Rolfe, John	. .	Beaconsfield, Buckinghamshire
Rolls, John E. W.		
Romilly, Edward	Somerset House	
Ross, Rev. A.	. .	Westwell Vicarage, Maidstone, Kent
Round, Charles Grey, M.P. .	102, Regent-street	Birch Hall, Colchester, Essex
Round, John, M.P.	. .	Danbury Park, Chelmsford, Essex
Rowland, Richard	. .	Creslow, Buckinghamshire
Rowland, William.	. .	Water Eaton, nr Oxford
Rowles, Charles.	. .	Ledwell Farm, Woodstock, Oxon.
Rowley, R. C.	. .	Holberks, Hadleigh, Suffolk
Royle, J. Forbes, M.D, Prof. K.C.	King'sCol,SomHse	
Ruck, Edmund		
Rumbold, Charles E., M.P. .	22, Chapel-street	Preston Candover, Basingstoke, Hants.
Rusbridger, George	. .	Goodwood, Chichester, Sussex
Rusbridger, John	. .	Goodwood, Chichester, Sussex
†Russell, Lord Chas. J. F., M.P.	6, Belgrave-square	Drakeloe Lodge, Woburn, Bedfordshire
Russell, T. A.	. .	Cheshunt Park, Waltham Cross, Herts.
Ryde, Henry Thomas	. .	Aylesbury, Buckinghamshire
Sadler, Henry	. .	Mid-Lavant, Chichester, Sussex
St. John, Lord	. .	Melchbourn, Higham Ferrers, Northam.
†St. Alban's, Duke of . . .	80, Piccadilly. .	Redbourne Hall, Brigg, Lincolnshire
Salomons, David	. .	Broom Hill, Tonbridge, Kent
Salter, T. F.	. .	Great Hallingbury, Essex
Sampson, John	. .	Brympton, Somerset.
Sampson, Benjamin	. .	Tulley Main, nr Truro, Cornwall
Sanctuary, Thomas	. .	Nunnery, nr Horsham, Sussex
Sanders, Henry	. .	Harlestone, nr Northampton
Sanders, Randle	. .	Nimwick House, Cumberland
Sanderson, James Martin . .	. .	Sunbury, Middlesex
Sandford, Mark.	. .	Martin, East Langdon, Dover, Kent
Sandham, Major	. .	Rowdell, Shoreham, Sussex
Sandle, William	. .	Wethersfield Place, Essex

Members.	Town Residence.	Country Residence.
Sandon, Lord	41, Grosvenor-st.	Norton House, Campden, Staffords.
Sandon, Samuel		North Hill, Biggleswade, Beds.
Sanald, S.		Great Cawseston House
Sargeant, Edward		Stamford, Lincolnshire
Sargeaunt, Rev. John		Stanwick, Higham-Ferrers, Northampton
Sarney, E.		Soundess, Nettlebed, Oxfordshire
Satterfield, Joshua		Green Heys, Manchester
Saunders, Samuel		Upton Grove, Tetbury, Gloucestershire
†Saunders, Thomas Bush	6, Brompton-square	Bradford, Wiltshire
Saville, G., Jun.		Cottesmore, Rutlandshire
Savill, Samuel		Bocking, Essex
Savours, William		Headington, Oxford
Sawbridge, Henry B.		East Haddon, Northampton
Scales, John		Hilloughton, Norfolk
Scarth, Jonathan		Shrewsbury, Salop.
Scobell, Capt. R.N.		High Littleton, Bath, Somersetshire
Scotson, Samuel		Toxteth Park, Liverpool, Lancashire
Scott, George Denistoun		Lovel Well, Sunninghill, Windsor, Berks
Scott, Thomas Edward		Carbrooke, Watton, Norfolk
Scudamore, Lieut.-Colonel		Kentchurch Court, Hereford
Seabrook, William		Boreham, Essex
Searle, Alfred		Cambridge
Searle, William		Cambridge
Seawell, Henry		Little Bookham, Surrey
Seawell, Thomas Samuel		Marelands, nr Farnham, Surrey
Selmes, Samuel		Beckley, Sussex
Senior, J. T.		Broughton House, Aylesbury, Bucks.
Seward, Samuel		Weston, Petersfield, Hants.
Sewell, Professor	Royal Veter. Collg.	
Shackel, George		Maple-Durham, Oxon.
Shafto, R. E. Duncombe		Whitworth Park, Rushyford, Durham
Sharp, William		Scarthing Moor, Nottinghamshire
Sharpe, James		Fawley Court Farm, Henley, Bucks.
Sharwood, Dendy	120, Aldersgate-st.	Clapton, Middlesex
Shaw, William, Jun.		Hemsbury Hill, Northampton
†Shawe, R. Fleetwood		Brantingham, Hull, Yorkshire
Shawe, R. N.		Kesgrave Hall, Woodbridge, Suffolk
Shawe, Samuel Pole		Hints Hall, Staffordshire
Sheen, Richard		Oxford
Sheepshanks, Archdeacon		Gluvias, Cornwall
Sheldon, Jonathan		Ensham, nr Oxford
Sheldon, William		Stanton St. John, Oxford
Sheldon, William		Stratford-upon-Avon, Warwickshire
Shepherd, Arthur		Shaw End, Kendal, Westmoreland
Sherborn, George		Ashford, nr Staines, Middlesex
Sherborn, Francis		Bedfont, Middlesex
Sherwood, ——		Purley, near Reading, Berkshire
Sherratt, John Simpson		Lichfield, Staffordshire
Shitler, John		Bradford Farm
Short, T.		Martin, nr Bawtry, Notts.
Shrubb, James		Dorchester, Oxfordshire
†Shubrick, Colonel		The Grove, Leatherhead, Surrey
Shute, ——		Frampton, Cothill, Bristol, Somerset
Shuttleworth, Mark		Tottenham, Middlesex
Silvertop, G.		Minsteracres, Northumberland
Simonds, J. B.		Twickenham, Middlesex
Simonds, W. Barrow		St. Cross, near Winchester, Hants.
Simmons, James		Sutton-Wick, near Abingdon, Berks.
Simpson, H. Bridgman, Jun.	1, Saville-row	Eaton, Retford, Notts.
†Simpson, Hon. John B.		Babworth Hall, Retford, Notts.

Members.	Town Residence.	Country Residence.
Simpson, John	. .	Bardwell, Suffolk
Sims, John		
Sinnell, Richard		
Sitwell, Rev. H. W.	. .	Leamington-Hastings, Southam, Warw.
Skirving, W.	. .	Queen's Square, Liverpool
Skyrme, John	. .	Splot, Cardiff, Glamorganshire
Slack, Joseph Albin . . .	46, Weym.-st. P.pl	Redburn House, St. Albans, Herts.
Slapp, Rev. Thomas Peyton .	. .	Old Buckenham Ldg, Attleburgh, Nfk.
Slark, William	155, Piccadilly	
Slater, John J., Jun.	. .	Haslebeech, Northamptonshire
Slatter, William	. .	Stratton, nr. Cirencester, Gloucestershire
Small, Henry	. .	Barfoot, Dorsetshire
Smallbones, Richard H. . .	. .	Hordley, Woodstock, Oxfordshire
Smart, William	. .	Rainham, Rochester, Kent
Smith, Alexander	. .	Cirencester, Gloucestershire
Smith, Charles Brent	. .	Whaddon, Stroud, Gloucestershire
Smith, Charles Culling . .	22, Arlington-st.	
Smith, Sir Culling Eardley, Bt.	. .	Bedwell Park, near Hatfield, Herts.
Smith, F.	. .	Hales Owen, Grange, Birmingham, Wks.
Smith, Henry	. .	Drax Abbey, York
Smith, Henry	. .	Heywood Fm., W. Waltham Maidenhd.
†Smith, J. James	. .	Down House, Blandford, Dorset.
Smith, J. Hogan	. .	Forberry Grove, near Newbury, Berks.
Smith, J. P.	. .	Wick, near Worcester
Smith, James	. .	Stanstead, near Chichester, Sussex
Smith, Sir John Wyldbore, Bt.	. .	Down House, Blandford, Dorset.
Smith, Robert	. .	Bingley-on-the-Hill, Oakham, Rutland.
Smith, Robert	. .	Heath Farm, St. Alban's, Herts.
Smith, W.	. .	West Rasen, Lincolnshire
Smith, William	. .	Hemel-Hempstead, Herts.
Smith, ——	. .	Coton, near Northampton
Smyth, George		
Smythies, Carleton	. .	Eye, Suffolk
Smythies, Rev. John Robert .	. .	Lynch Court, nr. Leominster, Hereford.
Snibson, Richard	. .	Bakewell, Derbyshire
Snow, Benjamin	. .	Sleaford, Lincolnshire
Snow, Johnson	. .	Ewerby, near Sleaford, Lincolnshire
Snowden, Rev. C. C.	. .	Slooe, Sussex
Solly, Samuel, F.R.S.	48, Up. Gower-st..	
Solly, Samuel Reynolds, F.R.S.	. .	Serge Hill, St. Alban's, Herts.
Somes, Samuel	. .	Wollaston, nr. Wellingboro', Northam.
Souhter, George	. .	Box Grove, near Chichester, Sussex
Sparks, William	. .	Crewkerne, Somerset.
Sparks, J.	. .	Loseley, Guildford, Surrey
Speakman, Robert	. .	Oxford
Spearman, ——	. .	Newton Hall, Durham
†Spencer, Hon. Capt., M.P. .	. .	Althorp Park, near Northampton
Spencer, William	. .	Adderbury, nr. Woodstock, Oxfordshire
†Spencer, Hon. F.	6, King-st. St. James	
Spicer, Thomas	. .	Bockhampton, Lambourne, Berks.
Spicer, John	. .	Esher-place, Surrey
Spong, Ambrose	. .	Manor Farm, Frindsbury, Rochester
Spooner, Professor Charles .	Royal Vet. College	
Spooner, Richard	. .	Worcester
Stace ——	. .	Berwick, Sussex
Stacey, William	. .	Burton Farm, Abingdon, Berks.
Stallard, Joseph	. .	Redmarley, Stroud, Gloucestershire
Stanier, Edward	. .	Wroxeter, Shrewsbury, Salop.
Stanier, John	. .	Heaton, near Shrewsbury, Salop.
Stanley, Edward	14, Grosvenor-sq. .	

Members.	Town Residence.	Country Residence.
Staples, John	. .	Highlands, near Dartford, Kent
Starling, Robert	13, Norf.-st., Islin.	
Starr, John	. .	Eastbourne, Sussex
Stedman, Edward	. .	High Ercal, Wellington, Salop.
Stedman, Gill	. .	Pakenham, Suffolk
Steele, Henry Perin, R.N.	36, Dover-street	Beaminster, Dorsetshire
Steele, Sir Robert	36, Dover-street	Meerhay, Dorsetshire
Steele, William	. .	Abergavenny, Monmouthshire
Stent, Matthew	. .	Cranford, Middlesex
Stephens, John	. .	Caversham Rise, Reading, Berks
Stephens, William	. .	Prospect Hill, Reading, Berks.
†Steuart, Robert, M.P.	. .	Alderston, Haddingtonshire
Stokes, Charles	. .	Kingston, Keyworth, Notts.
Stokes, Charles	. .	Munnell's End, Redmarley Dabital, Wor.
Stokes, Frederick	. .	Woodfields, Ross, Hereford.
Stokes, J. Allen	. .	Kervington, nr Evesham, Worcestershire
Stokes, John	. .	Pauntley, near Newent, Gloucestershire
Stone, George	. .	Fyfield Wick, near Abingdon, Berkshire
Stone, Rev. John Bramston	. .	Forest Hall, Ongar, Essex
Stone, Mark	. .	Fyfield Wick, near Abingdon, Berkshire
Stone, W.	. .	Streatley House, Reading, Berks.
Stone, W. F. Lowndes	. .	Brightwell, near Watlington, Oxon.
†Stracey, Henry J.	. .	The Hall, Kirby-Bedon, Norwich
Strafford, Henry	7, Brecknock-cres.	Babraham, Cambridgeshire
Stratton J. Locke	. .	Farthinghoe Lodge, Brackley, Northam.
Strickland, Walter		
†Stringer, Miles	. .	Effingham Hill, Leatherhead, Surrey
Strong, W.	. .	Hardingstone, Northampton
Stronge, Thomas	. .	Cirencester, Gloucestershire
Stroud, Henry V.	. .	Spettisbury, nr Blandford, Dorset.
Sturkey, T. O.	. .	Highgate. Newtown, Montgomeryshire
†Sturt, Henry Charles	16, Portman-sq.	Critchill Woodyates, Cranbourne, Dorset
Sumner, Rev. C. V. Holme	. .	Ripley, Surrey
Sumner, W. Holme	. .	Hatchland Park, Guildford, Surrey
Sutherland, J. W.	. .	Croydon, Surrey
Swaffield, Samuel	. .	Ampthill Park, Bedfordshire
Swainson, Rev. Chas. Litchfield	. .	Crick, Northamptonshire
Swann, James	. .	Ensham, nr Oxford
Tabor, C.	. .	Bocking, Essex
Tanner, William	. .	Patcham, nr Brighton, Sussex
Tatham, T. D. Fearon		
Tattershall, John	46, Lw Belgrave-pl	
Tattershall, Richard	Hyde Park Corner	
Taunton, W. P.	. .	Bristol, Somersetshire
†Tawney, Charles	. .	Oxford
†Tawney, Henry	. .	Banbury, Oxfordshire
Taylor, Isaac	. .	Shrewsbury, Salop
Taylor, John	. .	Bolas, Salop.
Taylor, Thomas	. .	Church Hill, nr. Chipping-Norton, Oxon.
Taylor, Thomas	. .	Burleigh Villa, Salop.
Taylor, Thomas Lombe	. .	Starston, Harleston, Suffolk
Taylor, Sir Charles, Bart.	. .	Holly Combe Lodge, Liphook, Hants.
Taylor, Walter	. .	Hockley, nr Alresford, Hants.
Templeman, John	. .	Crewkerne, Somersetshire
Thackrah, George	. .	Feltham, Middlesex
Theobald, George	. .	Starston, near Harleston, Norfolk
Thimbleby, William	. .	East Kirby, nr. Bolingbroke, Lincolnsh.
Thomas, James	. .	Lidlington, nr Woburn, Bedfordshire

Members.	Town Residence.	Country Residence.
Thomas, Rev. V.		Oxford University
Thompson, Rev. George		Abbott's Ann, near Andover, Hants.
Thompson, H. S.		Kirby Hall, Boroughbridge, Yorkshire
Thompson, R. T.		Kirby Hall, Boroughbridge, Yorkshire
Thompson, William C.		Abingdon, Berks.
Thomson, Guy		Oxford
†Thomson, Rt. Hon. C. Poulett,		Canada
Thornhill, Thomas		Woodleys, Woodstock, Oxon.
Thornton, Stephen		Moggerhanges House, Biggleswade, Beds
Thorold, B. H.		Harmonston Hall, nr Lincoln
Thoyts, M. G.		Sulhamstead House, nr. Reading, Berks.
Threlfall, Lazarus		Lancaster
†Throgmorton, R. G.		Buckland, nr Faringdon, Berks.
Thurnall, Henry		Royston, Cambridgeshire
Thurston, Capt. C. T., R. N.		Machynllaeth, Montgomeryshire
Tilden, John		Ifield Court, Gravesend, Kent
Tillyer, George		Feltham, Middlesex
Tillyer, George, jun.		Feltham, Middlesex
Tillyer, James		Harmondsworth, Middlesex
Tillyer, James, jun.		Harmondsworth, Middlesex
Tillyer, R. B. jun.		Harmondsworth, Middlesex
Tindale, Benjamin		Ewerby, near Sleaford, Lincolnshire
Tindale, Thomas		Sleaford, Lincolnshire
Toker, Richard Edward		Kenfield House, Canterbury, Kent
Tollet, George		Botney Hall, Newcastle-und.-Lyne, Staffs.
Tompson, Charles Kett		Witchingham Hall, Norwich, Norfolk
Tongue, Charles		Braunceston, near Lincoln
Tooke, William, F.R.S.	12, Russell-square	
Toovey, Henry		Hambleden, Henley-on-Thames, Oxon.
Toovey, Thomas		Joyce Grove, Oxon.
Toovey, William		Crowmarsh, Wallingford, Berks
Toovey, William		Newnham, Wallingford, Berks
Torkington, James		Stukely, Huntingdon
†Torr, William, Jun.		Riby, nr Caistor, Lincolnshire
Torr, Edward		Kingsbridge, Devon.
Tovey, Henry		Stanton, Wilts.
Towers, John		Pinkney's Green, nr Maidenhead, Berks.
Townsend, John		Oxford
Toynber, George		Hickington, Sleaford, Lincolnshire
Treby, Henry Hall		Cobham Lodge, Cobham, Surrey
Tremenheere, H. Pendarves		Penzance, Cornwall
Trenchard, Rev. J.		Staunton House, Heighworth, Wilts.
Trevor, Hon. General		Glynde, nr Lewes, Sussex
Treweeke, Rev. G.		Illogan, Cornwall
Tredgold, Henry		Chilbolton, nr Andover, Hants.
Trinder, William		Wantage, Berks.
Trinder, Daniel		Cirencester, Gloucestershire
Trotter, John		Staindrop, Durham
Trower, Henry S.		Castle Thorpe, nr Stony Stratford, Bucks.
Trumper, William		Iver, Colnbrook, Buckinghamshire
Trumper, James		Southall, Middlesex
Trumper, Edward		Nuneham Park, nr Oxford
Trumper, Robert		Wyke Farm, Isleworth, Surrey
Tuckey, Thomas		Compton-Beauchamp, Faringdon, Berks
Tuckwell, Humphry		Signet, nr Burford, Oxon.
†Tudway, C.		Wells, Somerset.
Tull, Edward		Peasemore, Newbury, Berks.
Tull, Richard		Crookham, Newbury, Berkshire
Turner, George		Barton Alphinton, nr Exeter, Devon.
Turner, William		Shipton, nr Woodstock, Oxon.

Members.	Town Residence.	Country Residence.
Turner, Vincent John . . .	. .	Shipton, nr Woodstock, Oxon.
†Turner, Chas. Hampden, FRS.	15, Bruton Street	Rooksnest, Godstone, Surrey
Turner, James	. .	Oxford
Turner, ——	. .	Shoreham, Sussex
Turney, W.		
†Turnor, Christopher . . .	. .	Stoke, Grantham, Lincolnshire
Twynam, J. T.	. .	Whitchurch, Hants.
Twynam, Thomas	. .	Bishopstoke, nr Winchester, Hants.
Twynham, Dr.	. .	Lainston House, nr Winchester, Hants.
Tylden, Lieut.-col. Sir J., F.R.S.	. .	Milsted, Sittingbourne, Kent
Umbers, Samuel	. .	Dunton Hall, Coleshill, Warw.
Umbers, Thomas	. .	Wappenbury, Warwickshire
Umbers, William	. .	Weston Hall, nr Leamington, Warw.
Umbers, William, jun. . .	. .	Wappenbury, Warwickshire
Unwin, Stephen, jun. . . .	. .	Coggeshall, Essex
Upperton, Edward F. . . .	. .	Thakenham, nr Stowington
Uppleby, L.	. .	Wooton Hall, Lincolnshire
Uppleby, William	. .	Bonby, Barton, Lincolnshire
Upton, Edward.	. .	Wroxeter, Shrewsbury, Salop.
Upton, Henry	. .	Aldwick, Bognor, Chichester, Sussex
Vaisey, Thomas	. .	Stratton, nr Cirencester, Gloucestershire
Vaizey, George	. .	Halstead, Essex
Vallance, James	. .	Hurst-Pierrepoint, Brighton, Sussex.
Vanderstegen, W. H. . . .	. .	Cane End House, Oxon.
†Vane, Rev. J.	. .	Dulwich, Surrey
Vaughan, James	. .	Osney Mill, Oxford
Vaughan, Rev. T.	. .	Llandwailog, Brecon
Venables, Charles	. .	Woburn, Beaconsfield, Bucks.
Vere, Gen. Sir C. Broke, bt. M.P.	4, Mid-Scot. Yard	Broke Hall, Nacton, Ipswich, Suffolk
†Verney, Sir Harry, Bt., M.P.	5, Park-St. Westm.	Claydon House, Winslow, Bucks.
Vevers, William	. .	Donnington Court, Herefordshire
Villiers, Lord	38, Berkeley-sq. .	
Viall, King	. .	Stoke, Clare, Suffolk
Villebois, F.		
Vines, R.	13, Grt. College-st.	
Waite, John Utting . . .	. .	Sibsey, nr Boston, Lincolnshire
Wake, Sir William, Bart. . .	. .	Courteen Hall, Northampton
Wakefield, John	. .	Sedgwick House, Kendal, Westmoreland
Wakely, William	. .	Rainham, Rochester, Kent
Walesby, Prime	. .	Ranceby, nr Horncastle, Lincolnshire.
Walker, George	. .	Greenfield Lodge, Strixton, Northamp.
Walker, James.	. .	Northleach, Gloucestershire
Walker, John	. .	Barton, nr Worcester
Walker, Rev. Henry . . .	. .	Heathfield House, nr Oxford
Wall, J. Ankley	Belgrave-square.	
Wallace, W. T.	. .	Shifford, nr Witney, Oxon.
Wallis, Owen	. .	Overstone, near Northampton.
Waller, H. S.	. .	Farmington, Northleach, Gloucester.
Waller, Rev. R.	. .	Bourton, Northleach, Gloucestershire
Wallington, James. . . .	. .	Charlecote, nr Warwick
Walpole, William	20, Upp. Belgr. Pl.	
Walsh, Sir John B., Bt., M.P.	28, Berkeley-square	Warfield, Bracknell, Berks.
Walsh, Henry	. .	Oxford

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Walsh, John	. .	Oxford
Walter, John	. .	Borden, Sittingbourne, Kent
Walter, William	. .	Gore House, Upchurch, Kent
Walters, J. W.	. .	Barnwood, near Gloucester
Warburton, Hen., M.P., F.R.S.	45, Cadogan-place	
Ward, Henry George, M.P. .	34, St. James's-pl.	Gilston Park, Harlow, Essex
Warner, William Mead . .	. .	Thomley, nr Thame, Oxon.
Warre, J. Ashley, M.P., F.R.S.	7, Belgrave-square.	
Warrender, Sir G. Bart. F.R.S.	. .	Clifden House, Maidenhead, Berks.
Warrington, L.	. .	Witney, Oxon.
Warriner, G.	. .	Bloxham Grove, near Banbury, Oxon.
Warry, George	. .	Shapwick, Glastonbury, Somerset
Wasey, C.	. .	Prior's Court, near Newbury, Berks.
Wasey, John F.	. .	Prior's Court, near Newbury, Berks.
Washbourne, E. B. . . .	. .	Speenhamland, Newbury, Berks.
Washbourne, T. E. . . .	. .	Speenhamland, Newbury, Berks.
Waters, Thomas	. .	Stratford Sub-Castle, Salisbury, Wilts
Waters, Thomas Robert . .	. .	Holcott, Northamptonshire
Watkins, Lloyd	. .	Pennoyre near Brecon, S. W.
Watkins, William	. .	Ombersley, Worcestershire
Watson, Colonel Henry . .	. .	Walkeringham, near Bawtry, Notts.
Weall, Thomas	. .	Woodcote Ldg. Beadington, Henley, Ox
Webb, Charles	. .	Oxford
Webb, Daniel	. .	Kiddington, Woodstock, Oxon.
Webb, Edward	. .	Adwell House, near Tetsworth, Oxon.
Webb, G.	. .	Beaumont Hall, near St. Alban's, Herts.
Webb, Jonas	. .	Babraham, near Cambridge
Webb, Richard	. .	Calcot, near Reading, Berks.
Webb, S.	. .	Stowe Lodge, Ipswich, Suffolk
Webb, Thomas	. .	Melshott, near Salisbury, Wilts.
Webb, William	3 Arundel-st. Strand	
Webster, Lady	. .	Battle Abbey, Sussex
Webster, Joseph	. .	Penns, near Birmingham, Warwickshire
Wedge, Francis	. .	Badminton, Tetbury, Gloucestershire
Wedlake, J.	. .	Hornchurch, Essex
†Weeding, Thomas	47, Mecklenbrg-sq.	
Weekes, Frederick	. .	Hurst-perpoint, nr Brighton, Sussex
Welch, Alfred	. .	Southall, Middlesex
Welford, R. G.	6, Chancery-lane	Ashford, Middlesex
Welland, Charles		
Wells, Thomas	. .	Hampnett, Northleach, Gloucestershire
Wells, Fleetwood	. .	Ellsborough, near Wendover, Bucks.
Welstead, Benjamin . . .	. .	Kimbolton, Huntingdon.
Welton, Cornelius	. .	Woodbridge, Suffolk
Wentworth, Godfrey W. . .	. .	Woolley Park, Wakefield, Yorkshire
West, J. P.	. .	College Green, Dublin
West, John	. .	Miningsby, near Horncastle, Linc.
Westbury, Giles	. .	Andover, Hants.
Westcar, Henry	. .	Burwood Cottage, Esher, Surrey
Western, Lord	35, South-street .	Felix Hall, Kelvedon, Essex
Westhead, John	. .	Manchester, Lancashire
Wetherell, William . . .	. .	Durham
†Weyland, John, F.R.S. . .	. .	Woodrising Hall, Hingham, Norfolk
Weyland, Richard	. .	Woodeaton House, near Oxford
Whieldon, George	. .	Welton, Northamptonshire.
White, John M.	. .	Warminster, Wiltshire
White, Joseph	. .	Anfield House, Romsey, Hants.
White, Robert	. .	Mere, Wiltshire
White, Thomas	. .	Berechurch Hall, nr. Colchester, Essex
Whitear, Rev. W.	. .	Harleston, Norfolk

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Whitehorne, Thomas	. .	Bampton, near Witney, Oxfordshire
Whitfield, W.		
Whitington, George . . .	. .	Whitmore House, Ripley, Surrey
Whitlaw, C.	30, Argyll-street	
Whitling, Henry John . .	52, Berners-street	
Whitter, William	. .	Steyning, Sussex
Whittle, John	. .	Toller-Fratrum, Dorsetshire
Whybro, Edward	. .	Tottenham Green, Middlesex
Wickham, ——		
Wickham, James	. .	Sutton Sidney, Whitchurch, Hants.
†Wickens, James Stephens . .	35, Mortimer-street	
Wicksted, Charles . . .	. .	Brand, Market-Drayton, Salop.
Wiggins, John	30, Tavistock-place	Tyndales, near Danbury, Essex
Wiley, Samuel	. .	Bransby, near York
Wilkinson, Rev. F. . . .	. .	Eastbourne, Sussex
Wilkinson, George . . .	. .	Wolveston, Stony-Stratford, Bucks.
Wilkinson, Capt. T. H. . .	. .	Walsham, Suffolk
Willan, William	. .	Rickling, Bishop-Stortford, Herts.
Williams, Edward Lloyd . .	. .	Gwernant Park, Newcastle-Emlyn, S.W.
Williams, G. T.	. .	Ilminster, Somerset.
Williams, John	. .	Buckland's, Faringdon, Berkshire
Williams, Rees	. .	Manest Court, near Brecon, S.W.
Williams, Richard	. .	Shifford, Witney, Oxfordshire
Williams, William	. .	Skethrog, near Brecon, S.W.
Willis, William	. .	Astrop House, Northampton
†Willoughby, H.		
Wilmot, Sir E., Bart., M.P. .	. .	Berkswell Hall, Warwick
Wilson, Rev. John	. .	Wood House, Oxford
Wilson, Hon. Henry . . .	. .	Alecto Hall, Leicestershire
Wilson, Christopher . . .	. .	Rigmaiden Park, Westmoreland
Wilson, Edward	. .	Abbot Hall, Kendal, Westmoreland
Wilson, J. H.	. .	The Grange, near East Grinstead, Suss.
Wilson, Thomas	. .	Brackley, Northamptonshire
Wincarls, Edward	. .	Marham Abbey, Marham, Norfolk
Winder, J. W. Lyon . . .	. .	Horstead House, Norwich, Norfolk
Windham, J. W., Jun.		
Windham, William, Jun. .	. .	Dinton, Salisbury, Wiltshire
Wing, F.		
Wing, William, Senior . .	. .	Steeple Aston, Woodstock, Oxon.
Wing, William, Jun. . . .	. .	Steeple Aston, Woodstock, Oxon.
Wing, T.	. .	Thorney Abbey, Peterboro', Northamp.
Wingate, Thomas	. .	Owmby, near Caistor, Lincolnshire
Winnal, Thomas	. .	Eccleshall Court, Ross, Hereford.
Winnall, John	. .	Berrow, near Tewkesbury, Worcester
Wippell John	. .	Exminster, Devonshire
Wither, Rev. L. B. . . .	. .	Manydown Park, Basingstoke, Hants.
Withers, Richard	. .	Gussage-St. Michael, Cranbourne, Dors.
Witt, James	. .	Denny Abbey, Cambridge
Wittenstall, W. F. . . .	. .	Langley Bury, Watford, Herts.
Wodehouse, Lord	. .	Kimberley Hall, Wymondham, Norfolk
Wodehouse, Edmund, M.P. .	. .	Wymondham, Norfolk
Wolfe, R. B.	. .	Wood Hall, near Newport, Essex
†Wood, Charles, M.P. . . .	. .	Ickleton Hall, Doncaster, Yorkshire
Wood, G.	. .	South Dalton, Beverley, Yorkshire
Wood, George		
Wood, George James . . .	. .	Adminster, Dorset.
Wood, H.	. .	Bramdean House, Alresford, Hants.
Wood, James	. .	Twineham, Cuckfield, Sussex
†Wood, John	28, Chester-street	Heath Farm, Cassiobury, Watfd., Herts.
Wood, John	. .	Milton, near Woodbridge, Suffolk

Members.	Town Residence.	Country Residence.
Wood, John	. .	Fordhouse, near Newent, Gloucestersh.
Wood, Jonathan	. .	Holt Farm, St. Alban's, Herts.
Wood, Rev. W.	. .	Staplegrove, Taunton, Somersetshire
Wood, William	. .	Kelvedon, Essex
Woodman, Henry	. .	Stitchcombe, near Mildenhall, Wilts.
Woodman, Thomas . . .	. .	Tring, Hertfordshire
Woods, James	. .	Clapton, Northamptonshire
Woods, Samuel A.	. .	Westleton, Suffolk
†Woods, W. Leyland . . .	. .	Chilgrove House, near Chichester, Sus.
Woodward, F.	. .	Little Comberton, Worcestershire
Woodward, William . .	. .	Bredons Norton, Tewkesbury, Gloucest.
Woolff, Rev. G.	. .	Guinear, Cornwall
Workman, Joseph	. .	Greenwich, Kent
Worlledge, John	. .	Ingham, near Bury St. Edmund's, Suff.
Worrall, George	. .	Frenchay, Bristol, Somerset.
Worthington, Richard	. .	Brockhurst, near Coventry, Warwicksh.
†Wratislaw, William Ferdinand	. .	Rugby, Warwickshire
Wreford, William	. .	Bristol, Somersetshire
Wright, George	. .	Grindle, Shiffnal, Salop.
Wright, Herbert	. .	Hatton, Shiffnal, Salop.
Wright, John	. .	Lew, near Witney, Oxon.
Wright, Robert.	. .	Norwich, Norfolk
†Wrightson, W. Battie, M.P. .	. .	Cusworth Park, Doncaster, Yorkshire
Wyatt, George	. .	Chedham, Emsworth, Hants.
Wyatt, Hugh	. .	Cissbury, near Findon, Sussex
Wyatt, Thomas, Jun.	. .	Oxford
Wylde, Rev. William	. .	Woodborough, near Pewsey, Wiltshire
Wynford, Lord	. .	Leesons, near Chiselhurst, Kent
Wynne, Rice	. .	Shrewsbury, Salop.
Wynniatt, Rev. R.	. .	Guiting Park, Whinchcombe, Glouces.
Yates, John		
Yeatman, Rev. H. F.	. .	Stock House, Sturminster, Dorset.
Yeld, W. W.	. .	Armitage, Rudgeley, Staffordshire
Yelloly, John, M.D., F.R.S. .	. .	Man. Ho., Dawlish, Teignmouth, Dev.
Yorke, John	. .	Thrapstone, Northamptonshire
Yorke, Thomas	. .	Kinnington, Shiffnal, Salop.
Young, Matthew	. .	Begbrooke, near Woodstock, Oxon.
Young, Rev. B.	. .	Wartling, Sussex
Zetland, Earl of	. .	Aske Hall, Richmond, Yorkshire

HONORARY MEMBERS.

Stevenson, Andrew, Esq., United States' Minister.

Weyer, M. Van de, Belgian Minister.